THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD



MACK TRUCKS

Get Things Done!

● Extra effort—that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than on vital construction work and on the job of keeping raw materials flowing from the mines, the forests and the oil fields.

Here's work that's cut out for Mack trucks... jobs where big Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can boost output on your particular job... *get things done* faster and at lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

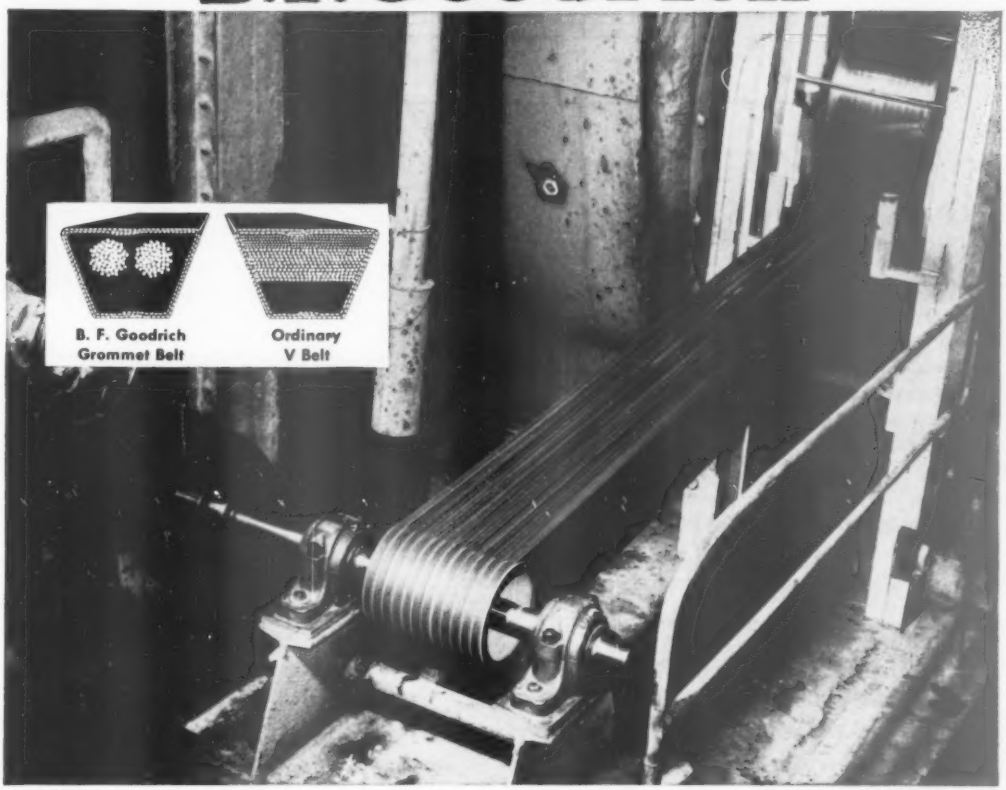
...outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Mack Model LFT diesel-powered tractor with 20-ton, side-dump trailer, serving Lone Star Cement Corp.



RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Belt service tripled by changing to B. F. Goodrich grommet belts

B. F. Goodrich grommet V belts cut costs 20 to 50%

ORDINARY V belts on this drive (a big fan for drying grain) lasted 1674 hours. The company wanted to cut costs by getting longer life from belts so they called in a B. F. Goodrich man and B. F. Goodrich grommet belts were installed. Grommet V belts ran 5153 hours . . . more than three times longer than ordinary belts. Why is this a typical example of grommet belt performance — why do grommet V belts outlast other belts?

Endless — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping cord sections. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless grommet belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet belt is more flexible, grips the pulleys better. Size for size, grommet belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B.F.Goodrich has the grommet! — No other multiple-V belt is a grommet belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B.F.Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

ROCK PRODUCTS

JUNE, 1951 THE INDUSTRY'S RECOGNIZED AUTHORITY VOL. 54, No. 6

Bror Nordberg
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Nathan C. Rockwood
Editorial Consultant

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ROCK PRODUCTS is published monthly by MACLEAN-HUNTER Publishing Corporation, 309 West Jackson Blvd., Chicago 6, Illinois; Horace T. Hunter, President; E. R. Gauley, Vice President; J. L. Frazier, Secretary. Copyright, 1951. Entered as second-class matter, Jan. 30, 1936, at the Chicago, Ill. post office under the act of Mar. 3, 1879. Additional entry at Milwaukee, Wis.
ROCK PRODUCTS is indexed regularly by Engineering Index, Inc. and the Industrial Arts Index.

SUBSCRIPTION INFORMATION

Subscription Price: United States and Possessions, Canada one year, $2.00; two years, $3.00; three years, $4.00. Pan American, one year, $4.00; two years, $7.00; three years, $10.00. All other foreign, one year, $6.00; two years, $12.00; three years, $15.00. Twenty-five cents for single copies. Canadian subscriptions and remittances may be sent in Canadian funds to ROCK PRODUCTS, P. O. Box 100, Terminal "A," Toronto, Canada.
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You SEE the saving!



Above: **EASTON BD hydraulic drop door truck bodies for rugged, versatile duty on earth, rock and ore moving jobs.**

Below: **EASTON TP pan type side-dump trailers for big payloads at low cost in shovel-to-crusher hauling.**

Investigate these and other EASTON side-dumps. Capacities are limited only by the truck chassis of your choice.

Watch that smooth side-dump action!

You *roll up, dump* and *roll on!* Side-dumping cuts out needless backing and turning. You can see the saving in time, money, effort!



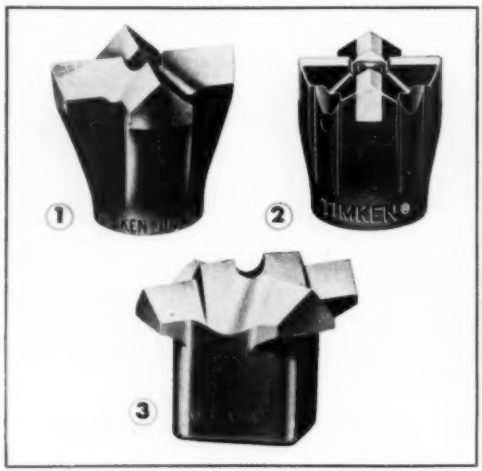
Get the facts straight from headquarters — from EASTON side-dump engineers!

EASTON
Side-Dumps

B-1046

Easton Car & Construction Company, Easton, Pa. • Headquarters for Side-Dump Cars, Truck Bodies and Trailers

Only the Timken Company offers all 3 rock bit types...





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1 MULTI-USE. Basic removable rock bit for 18 years. Gives lowest cost per foot of hole when full increments of the steel can be drilled and when all bits are returned for reconditioning. Low cost.

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The Timken Company's Rock Bit Engineering Service is always ready to help you with your rock bit problem and to help select the right bit for your job. With more than 17 years' experience and *all three* rock bit types to choose from, our Rock Bit Engineering Service can assist you in getting the bit performance you need—whether it's lowest cost per foot of hole, lowest unit bit cost, greatest possible drilling speed, or any other desired advantage.

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On jobs like this...

NORTHWEST ADVANTAGES MEAN MONEY!

Here's rock—the kind of rock that really tests a shovel day in and day out. This is another *Key Machine* spot that calls for the best in equipment. Your Northwest is built for the *Key Machine* spots. It's built to make money. Northwest brings you a combination of advantages found in no other Shovel, Crane, Dragline or Pullshovel . . . advantages that make it a real Rock Shovel—and when you have a real Rock Shovel you *never* have to worry about output in easy digging.

Profits begin in the *Key Machine* spots. You can't afford anything but the best at the heart of the job. Plan ahead now to have a Northwest Rock Shovel.

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1514 Field Building, 135 South LaSalle Street
Chicago 3, Illinois

- Simplicity of design for easy maintenance.
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NORTHWEST

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The JOY Champion sets absolutely new standards in blast-hole drilling. Months of operation in field after field have proved that it drills many times faster, and at far lower cost per foot, than any other drill on the market. Here's why . . .

REVOLUTIONARY DESIGN: The Champion Drill continuously pressure-cuts the rock with a rotating, tri-cone roller bit. It operates quietly, no deafening hammer strokes.

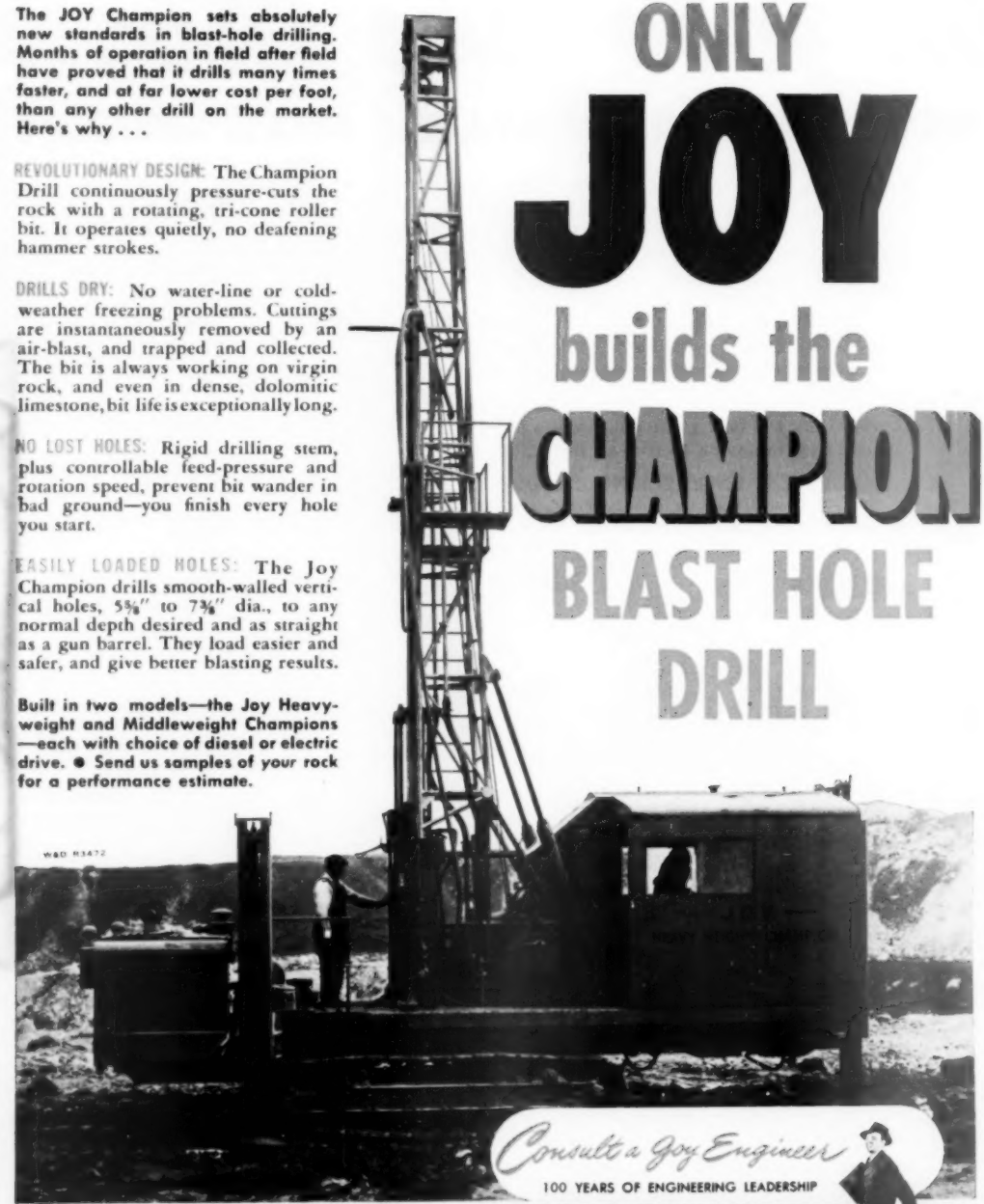
DRILLS DRY: No water-line or cold-weather freezing problems. Cuttings are instantaneously removed by an air-blast, and trapped and collected. The bit is always working on virgin rock, and even in dense, dolomitic limestone, bit life is exceptionally long.

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EASILY LOADED HOLES: The Joy Champion drills smooth-walled vertical holes, 5⅝" to 7⅞" dia., to any normal depth desired and as straight as a gun barrel. They load easier and safer, and give better blasting results.

Built in two models—the Joy Heavyweight and Middleweight Champions—each with choice of diesel or electric drive. ● Send us samples of *your* rock for a performance estimate.

ONLY JOY builds the CHAMPION BLAST HOLE DRILL



Consult a Joy Engineer

100 YEARS OF ENGINEERING LEADERSHIP

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Look Into this Traylor TC Gyratory for efficient, large volume, primary crushing



NEARLY 22 FEET across the *non-weaving, straight line bar type spider* of this 60 inch Traylor TC! Six smaller sizes, down to 20 inch, are proportionately just as rugged . . . have feed openings of the same generous proportions.

YES, THAT'S THE FAMOUS, exclusive Traylor BELL HEAD and CURVED CONCAVES combination that nips larger rock . . . crushes it more uniformly . . . saves power, time and maintenance expense.

UPPER AND LOWER SHELLS are kept as simple as possible. Transportation and installation problems control the number of sections of each. The Traylor method of assembly assures single casting rigidity.

THE *one* crusher which brings *all* of the advantages of gyratory crushing to primary operations is the Traylor TC Gyratory. In it *alone* are found the Traylor *bell head* and *curved concaves* which have become the by-word of gyratory crushing performance and economy. Eccentric and counter shaft bearings are protected from excessive wear by the simple, effective Traylor dust seal and a water-cooled, forced-flow oil lubricating system. If you need a large volume primary crusher to satisfy rising production demands, it will pay you to investigate a Traylor TC Gyratory today.



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to get full details on a Traylor TC Gyratory

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357 MILL ST., ALLENTOWN, PA.

I would like to see how a Traylor TC Gyratory can increase the efficiency of my plant.

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SALES OFFICES: New York, N.Y.; Chicago, Ill., Los Angeles, Calif. Canadian Mfrs: Canadian Vickers, Ltd. Montreal, P.Q.

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Use Delvac Oils to help keep engines clean, reduce maintenance costs, increase equipment availability.

A dirty engine is a *liability*—cuts deeply into your profits because it requires excessive maintenance, keeps expensive equipment unnecessarily idle. To avoid such troubles, use the oils that help *keep engines clean*—Delvac Oils!

Delvac Oils are ideal for both heavy-duty gasoline and Diesel engines. They have unusually high resistance to oxidation, and are exceptionally detergent and dispersive. They hold formation of harmful deposits to a minimum . . . protect rings, pistons, cylinders and bearings against corrosion and wear . . . assure more available power—*rock-bottom upkeep costs!*



Get more work—*more profits*—from your engines with Delvac Oils—recommended or approved by 125 leading engine and equipment builders!



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Socony-Vacuum gives you . . .

- Help on maintenance problems.
- Individual, tested lubrication schedules.
- Advice on correct application of lubricants, proper handling and storing.
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1. **DELVAC OILS**—for all gasoline and automotive-Diesel engines.
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THE FLYING RED HORSE COMPANIES: SOCONY-VACUUM OIL COMPANY, INC. MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

NOW . . . . . Front-End of New ALLIS-



1-Yd. HD-5G
Drawbar hp.: 40.26
Dumping height*: 9 ft. ¼ in.
Total Weight: 16,200 lb.

Standard Buckets up to 4 cu. yd.
(light materials buckets up to 7 cu. yd.)

2-Yd. HD-9G
Drawbar hp.: 70
Dumping Height*: 11 ft. 4½ in.
Total Weight: 29,800 lb.

The Newest, Finest Tractor Line on Earth

The new Allis-Chalmers tractors are not just refinements of existing models . . . *they are new from the ground up* . . . without compromise anywhere in design or materials. Back of their design are your own ideas and those of your operators and mechanics. These are combined with the vast experience of Allis-Chalmers to set new standards of Performance, Durability, Simplified Servicing, Ease of Operation.

Get the full story from your ALLIS-CHALMERS DEALER

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE 1, U. S. A.
Originator of the Torque Converter Tractor

Shovels for the Complete Line
CHALMERS Tractors



14 Interchangeable Attachments

- Standard Buckets
- Light Materials Buckets
- Heavy-Duty Buckets
- Rock Forks
- Bulldozer Blades

Plus other attachments for some models

Introducing a New Era of Tractor Usefulness

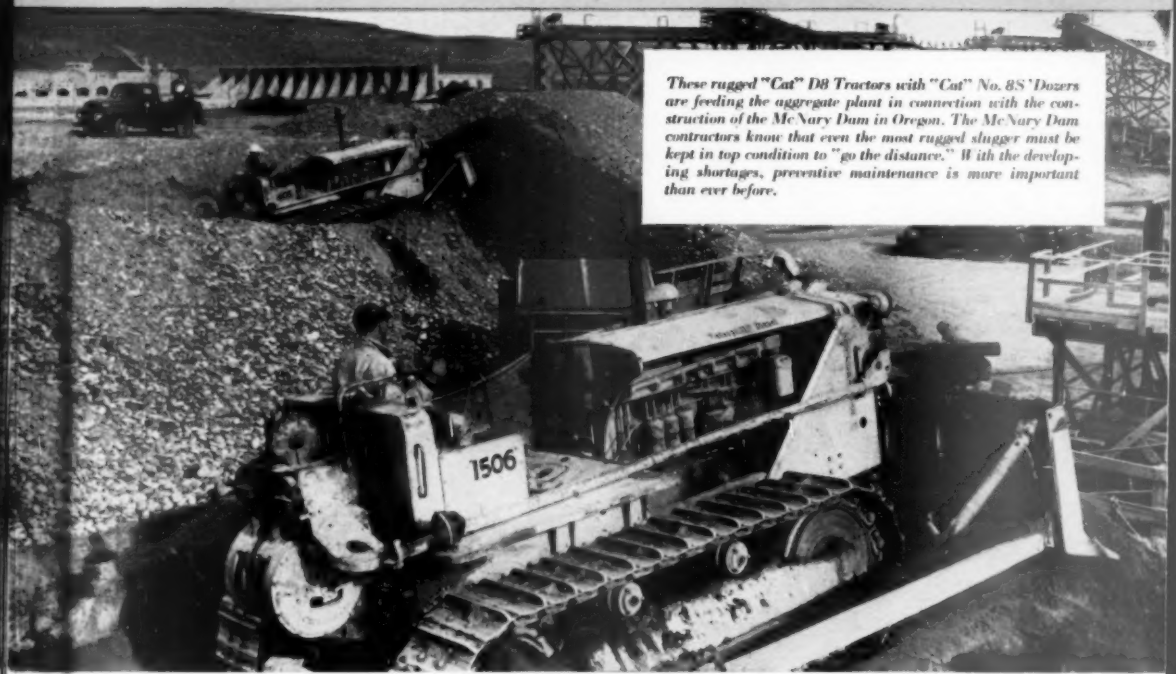
These new Tractomotive shovels on the larger size Allis-Chalmers tractors now bring you the same wide utility, the same outstanding performing ability as the popular HD-5G — the Tracto-Shovel that revolutionized excavating and material handling.

3-Yd. HD-15G
Drawbar hp.: 102
Dumping Height*:
12 ft. 8 in.
Total Weight: 40,000 lb.

4-Yd. HD-20G
Hydraulic Torque Converter Drive — 175 net engine hp.
Dumping Height*: 13 ft. 5 in.
Total Weight: 61,600 lb.

*Height of bucket hinge

There's a big



These rugged "Cat" D8 Tractors with "Cat" No. 8S 'Dozers are feeding the aggregate plant in connection with the construction of the McNary Dam in Oregon. The McNary Dam contractors know that even the most rugged slugger must be kept in top condition to "go the distance." With the developing shortages, preventive maintenance is more important than ever before.

IF YOU WANT TO HELP YOUR COUNTRY— AND YOURSELF AT THE SAME TIME— READ EVERY WORD ON THESE TWO PAGES

Keeping equipment *on the job* is of prime importance today—to the nation as well as quarry operators. Defense needs of rock products will strain present facilities. Last year cement-producing operations involved 57 *billion* tons of limestone and cement rock; crushed stone for aggregate took 330 million tons; and sand and gravel production stood at 350 million tons.

Right now there is a shortage of material with which to build urgently needed machines and parts. Military and Defense Rated Orders get the nod over unclassified civilian needs. Steel and other materials are in short supply. This means that you—with our help—must get every last machine-power hour out of the equipment and parts you now have.

Down-time will not only weaken the defense effort, it can put the quarry operator himself in the hole. During the emergency the need for working equipment extra hours and extra hard puts the operator on the spot. He must rely more than ever before on preventive maintenance to see things through.

So to stay in business profitably, and help America arm for defense, do these things now:

1. Use equipment properly. "Cat" machines are built for hard use—not abuse.
2. Give *extra* attention *now* to preventive maintenance (see next page).
3. Discuss your parts needs and maintenance problems with your "Caterpillar" dealer. His maintenance responsibility begins where your operators' and mechanics' responsibility ends. He has the skilled servicemen and equipment to rework and rebuild worn parts to keep your machines on the job longer.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



The last war showed the Military that "Cat" Earthmoving Equipment was as important to defense and offense as tanks. Here Sgt. Robert Chrisman operates a "Cat" D7 Tractor with matching blade on Davison airstrip at Ft. Belvoir, Va.

job ahead!

You're the Doctor

Today no owner can afford to think of direct costs alone. Good care of equipment can mean the difference between a producing machine and one laid up for repairs. To see how good care can save many hours of equipment life, reread your Operator's Instruction Book often and follow these suggestions.



• DUST

Think of dust as Machine Enemy No. 1. A few grains today—a few more tomorrow—and soon the result adds up to serious wear. Dust or dirt plugged breathers or air cleaners—use of dirty oil containers—loose intake manifolds—loose inspection covers—dirty clutch compartment—failure to wash flywheel clutch compartment—worn seals on crankshaft—defective gaskets—failure to clean oil filter openings . . . these are some of the vulnerable spots.



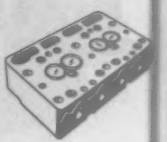
• TRACK ASSEMBLY

Don't let abusive use or neglect cripple the service life of your track assembly. Track adjustment and lubrication of rollers, carrier rollers and idlers are your job. Before excessive wear occurs on grousers, links, pins, bushings, idlers, rollers and sprockets, call in your "Caterpillar" dealer. He can build up grousers, rollers, idlers and links, and replace sprocket rims and turn pins and bushings so you will have many additional hours of service.



• CYLINDER HEADS

Prevent cracked cylinder heads by avoiding overheating, freezing, scale deposits, filling a hot engine with cold water, pulling heads down too tight, and other poor maintenance practices. Your "Caterpillar" dealer can repair most cracked cylinder heads. He can replace worn valve seats with valve inserts and restore the rocker arm mechanism to serviceable limits. Consult your Operator's Instruction Book for proper cooling system and valve care.



• COOLING

Don't let your engine overheat. Keep the cooling system free of scale, rust and sediment. Use soft or treated water, and when freezing temperatures exist, protect your engine with anti-freeze. Clean the radiator regularly with chemical flushing solutions. Remove foreign matter from the core by brushing or washing. Prevent engine troubles which come with overheating. Consult your Operator's Instruction Book for proper cooling system care.



• LUBRICATION

Careful lubrication practices will add much to your satisfaction through equipment performance, economy and long life. Use *only* recommended lubricants, changing the lubricant at proper intervals. And use *only* "Caterpillar"-proved filter elements. Remove dirt from fittings and clean around the crankcase filler cap before adding oil. A little care saves many hours of engine life. Consult the lubrication chart in your Operator's Instruction Book.



• PISTONS AND LINERS

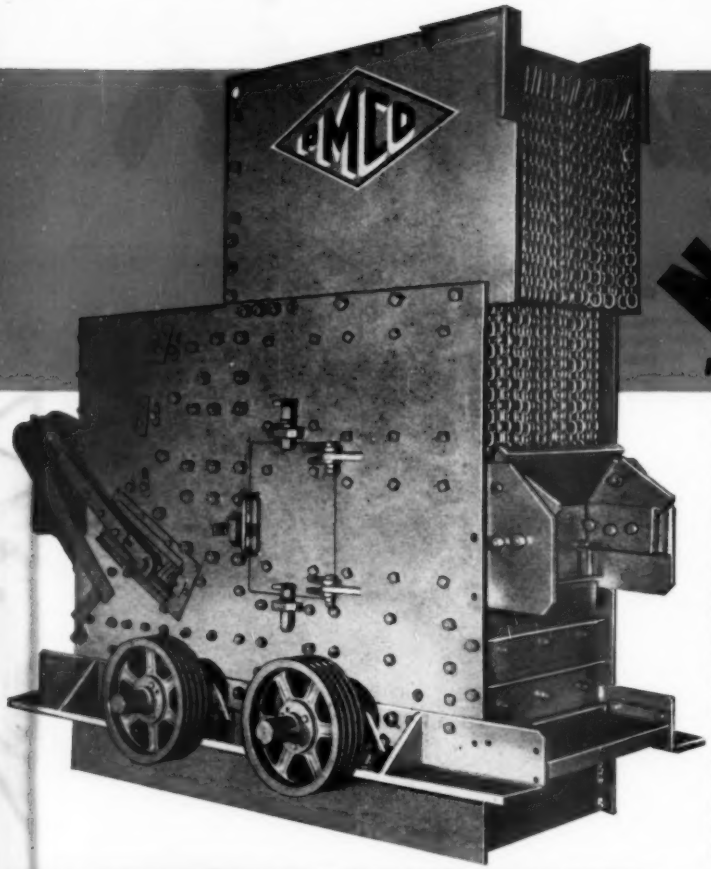
Almost all the piston wear occurs in the upper ring groove. Your "Caterpillar" dealer can renew your pistons by machining the upper ring groove for a wide ring, many sizes of which are chrome plated. Worn liners can be deglazed and put back to work for many additional hours of service life. Consult your Operator's Instruction Book for information on lubrication and the oil cooling system.



CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



NOW GET

MODEL 3240 IMPACT MASTER

Heavy duty construction throughout. Weighs 34,000 lbs. Gives you up to 250 tons per hour minus 2½" with 125 to 150 horsepower in average gray limestone. Produces 125 tons per hour minus 1" in many types of rock. Reduces material up to 50" long that will pass freely through its 32" wide x 40" high feed opening to specification size in one operation. Two heavy rotor hammers rotate in the same direction at speeds from 550 to 1000 rpm on 5-15/16 diameter special steel shafts. Three-way adjustment for finished product size. Available on skids, or combined with auxiliaries as complete portable or stationary units for operation in open or closed circuit.



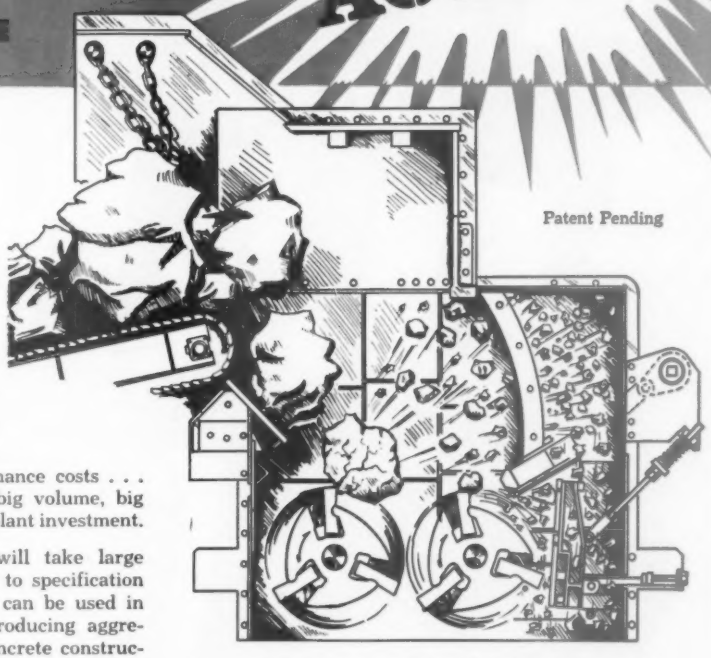
Proved Performance

Model 3240 Impact Master operating since April, 1950 in road rock - aglime setup at River Products Quarry, Iowa City, Iowa. Well over 100,000 tons of minus 2½" have been produced with no maintenance on wearing parts. Output is fed to screen with oversize going to a No. 5 Universal Hammermill.

STEP INTO BIG VOLUME, BIG PROFIT OPERATIONS AT LOWEST PLANT INVESTMENT WITH PMCO CONTROLLED IMPACT ACTION

ALL 3 WITH CONTROLLED IMPACT ACTION

PEAK TONNAGE
LOWER COSTS
BETTER QUALITY CUBICAL AGGREGATE



Patent Pending

Controlled Impact Action

. . . . the exclusive operating principle of the PMCO Impact Master is here to give you peak tonnage of better quality finished material at lowest cost per ton. It makes possible a ratio of reduction that eliminates the need for much accessory equipment, cuts power, labor and maintenance costs . . . enables you to step into the big volume, big profit picture with a minimum plant investment.

The PMCO Impact Master will take large quarry material and reduce it to specification size in one fast operation. It can be used in open or closed circuits for producing aggregates for road building and concrete construction, and can be adjusted for the simultaneous production of aglime in profitable percentages when desired. It cuts costs in reducing many types of non-abrasive and low silica content materials, and operates at high speed efficiency in wet sticky materials that slow down production in conventional machines. Models are available with capacities up to 500 tons per hour. Investigate the PMCO Impact Master now! Get the field-proven story of Controlled Impact Action. Write for illustrated literature.

Clean, cubical aggregate is produced by the terrific impact of rigidly mounted revolving rotor hammers intercepting rock in motion. By controlling the infed rock and directing its flow, practically 100% of the breaking is accomplished by the rotor hammers, making it possible to better control finished product size. There is no attrition, no rubbing, no grinding. Finished material is immediately discharged from the breaking chamber. As a result you get greater capacity at lower horsepower per ton, a more uniform gradation cubical aggregate . . . . . greater finished product control.

PETTIBONE MULLIKEN CORPORATION

Construction Equipment Division

4700 West Division Street, Chicago 51, Illinois
Phone SPaulding 2-9300



TELSMITH EQUIPMENT FOR DAMS



TVA's Watauga Dam, Tenn. Four different types of Telsmith Crushers used on this job.

● Huge dam projects and Telsmith Aggregate Plants go together. Many dam builders call in Telsmith engineers right at the start—for consultation as to the proper plant layout and the right equipment to use. Then Telsmith makes the detailed drawings for the erection of the plant and furnishes most of the machinery. Telsmith designed plants have proven their efficiency on many large projects and Telsmith equipment has a world-wide reputation for the production of low-cost aggregate. The ruggedness of Telsmith equipment is strikingly demonstrated by long life in severest service, on successive projects. After producing 1,500,000 tons of aggregate at Center Hill Dam, the same Telsmith equipment is now turning out about the same amount of aggregate at Buggs Island Dam.



Center Hill Dam, Tenn. Telsmith designed complete crushing-screening plant; and furnished most of the equipment.



Buggs Island Dam, Va. This Telsmith crushing plant also produced the aggregate for Center Hill Dam.

Save TIME and MONEY Consult Telsmith Engineers—Ask for Bulletins 266 and 271



Norfork Dam, Ark. This 500 ton per hr. capacity combination quarry and sand and gravel plant was Telsmith designed and equipped.

MILWAUKEE TELSMITH WIS. U.S.A.



Philpott Dam, Va. Here, too, the crushing-screening equipment is Telsmith.



Mount Morris, Dam, N. Y. The 300-350 tons per hour rock crushing plant is Telsmith designed and equipped.

OTHER DAMS BUILT WITH TELSMITH EQUIPMENT

- Alatoona Dam, Georgia
- Ariel Dam, Ariel, Wash.
- Boysen Dam, Shoshoni, Wyo.
- Carpenter Dam, Arkansas
- Cascade Dam, Washington
- Clark Hill Dam, Augusta, Ga.
- Conowingo Dam, Conowingo, Md.
- Dale Hollow Dam, Tennessee
- Davis Dam, Nevada
- El Presidente Dam, Mexico
- Fort Gibson Dam, Oklahoma
- Grand Coulee Dam, Washington
- Kortes Dam, Wyoming
- Morony Dam, Montana
- South Holston Dam, Tennessee

MS-11

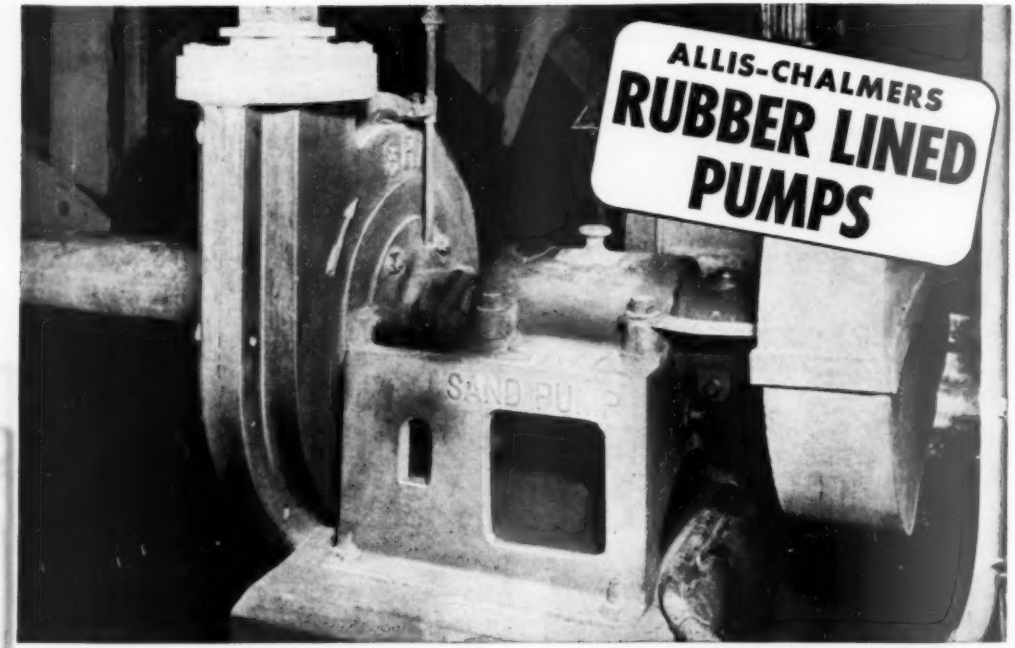
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Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Mines Eng. & Eqpt. Co., San Francisco 4, Calif. • Interstate Equipment Co., Statesville, N. C. • Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 16, Va. • Wilson-Weesner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.



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1. **Long Life** — Rubber compounds especially made for each application provide from 10 to 50 times the wear resistance of the hardest metals on such jobs as pumping tailings, classifier overflow, grinding mill discharge and other operations involving hard, abrasive materials of ⅛" to 325 mesh size.
2. **Easy Servicing** — The rubber casing liner is completely separate from the casing. It may be removed and replaced without moving the pump itself. The impeller is screwed onto the shaft and also may be removed easily. Thus, a complete supply of spare parts may be kept on hand at moderate cost. Neither standby pumps nor long shutdowns for pump rehabilitation are required.
3. **Flexibility In Operation** — The Allis-Chalmers Rubber Lined Pump is usually driven by a *Texrope* V-belt drive. Its head and capacity may be varied considerably by simply changing the speed of the drive. Where changes are frequent, the *Vari-Pitch* Automatic sheave provides instant speed control at very moderate cost.
4. **Application Engineering** — Each job is individually engineered by a competent Allis-Chalmers application engineer who is familiar with solids pumping problems. You can be sure of exactly the right pump and exactly the right materials for lowest cost per ton pumped.

Get full details on what the Allis-Chalmers Rubber Lined Pump can do for you. Call your A-C District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin, and ask for Bulletin 08B7311. A-3347

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

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UNLIMITED

through LOW-COST AGGREGATE!



Underwood and Underwood

AMERICA needs millions of tons of aggregate for building up her skylines to meet the demands of expanding industry . . . and an expanding transportation system to link key areas.

Today's "preparation program" means unlimited aggregate production . . . *aggregate that must be produced at increasingly lower costs.* It means the use of *quality* machines, with the big volume capacity, the rugged durability and the low operating cost that makes unlimited construction economically possible.

American contractors have the know-how to get any job done better and faster . . . Cedarapids gives them the equipment that assures economy. Whether you need complete plants or single units, for aggregate or asphalt, see your Cedarapids distributor for OPPORTUNITY UNLIMITED in competitive bidding.

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Built by IOWA

HEADQUARTERS FOR *QUALITY* EQUIPMENT!



SUPER TANDEM

Exceptionally high screening capacity added to high crushing output of the Super Tandem fills the need for a plant that can process material with high percentages of fines. Where greater volume is required, use the Master Tandem . . . for average size gravel jobs, pick the Junior Tandem . . . or, the Pitmaster for smaller jobs. Add a Portable Primary to make a complete rock plant. There's a size and type for any quantity, every specification.



MASTER MIXER

This high capacity asphalt plant is ideal for jobs requiring a continuous flow of accurately mixed bituminous material. For the big jobs, the Model "E" handles up to two tons at a batch . . . if you need only a few loads for patching, choose the Patchmaster. Cedarapids complete line of batch type and volumetric type bituminous mixing plants gives you the exact size and type you need.



IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.



We Broke the Law*

. . . and got away with it!

Crushed wet rock at Henry J. Kaiser's Radum Plant near Pleasanton, California, just naturally wanted to roll downhill. This presented a serious obstacle to the plans of Kaiser engineers, who were trying to increase tonnage at the sizing screens without the expense of installing an elevator system to lift this extremely wet and muddy rock. Outlining their problem to the Gilmore Steel & Supply Company representative, the Kaiser men were introduced to the use of Boston Woven Hose & Rubber Company's Bull Dog Herringbone Conveyor Belting. This belt, shown here, features a unique top cover of molded chevron designed rubber steps for uphill conveying and provides efficient drainage of water and mud from the belt surface.

Now in service only a little over 16 months, the BWH belt has already established a record of high tonnage at low cost.

If your application calls for a special construction, let us demonstrate how dependable BWH products can help boost your production and profits, while lowering your costs.

*We refer, of course, to Newton's law of gravity.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

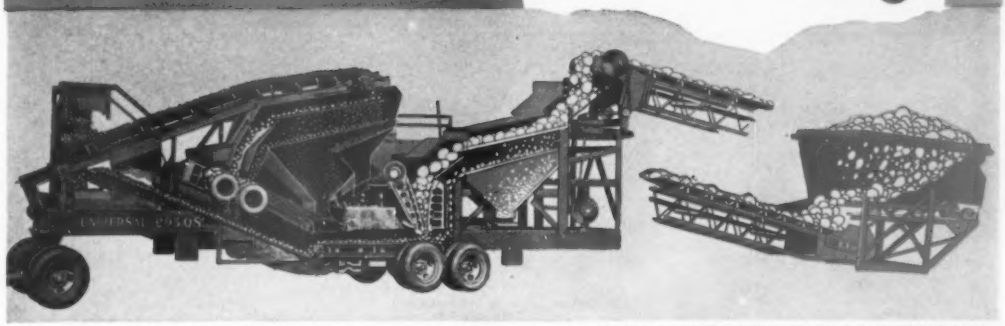
PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

BWH DEPENDABLE RUGGEDNESS

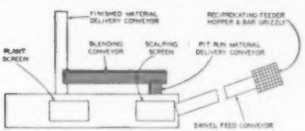
FREE AGGREGATE

FOR BIGGER PAYLOADS MORE PRODUCT COMBINATIONS

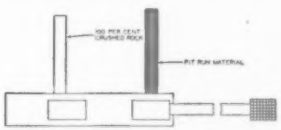
The UNIVERSAL 293QS TwinDual Gravel King



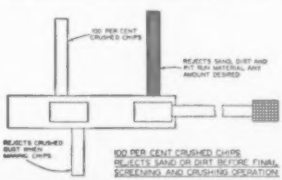
PRODUCT COMBINATIONS TO FIT A VARIETY OF JOBS



FOR PRODUCING ROAD AGGREGATE
BLEND FINISHED SIZE PIT RUN MATERIAL WITH CRUSHED MATERIAL



FOR PRODUCING 2 PRODUCTS SIMULTANEOUSLY
100 PER CENT CRUSHED ROCK AND SIZED PIT RUN MATERIAL



Universal gives you more tons per hour at less cost per ton with three full stages of crushing and **two screens** in the 293QS TwinDual Gravel King.

Pit run material of finished size is pre-screened and does not pass through the main plant. You get **Free Aggregate** which increases over-all production 50 to 100%. The main plant screen sizes crushed material only and is not burdened with natural finish. Top crushing capacity is provided by Universal's exclusive TwinDual Method which divides the crushing load between three crushing stages: First stage - 18" x 24" or 20" x 36" Jaw Crushers, Second and Third stages - 24" or 30" TwinDual Roll Crushers.

For those big jobs requiring volume production and a variety of finished product combinations, investigate the 293QS TwinDual Gravel King. Complete details in Bulletin No. U501. Write for your copy.

UNIVERSAL ENGINEERING CORP. division of PETTIBONE MULLIKEN CORP.

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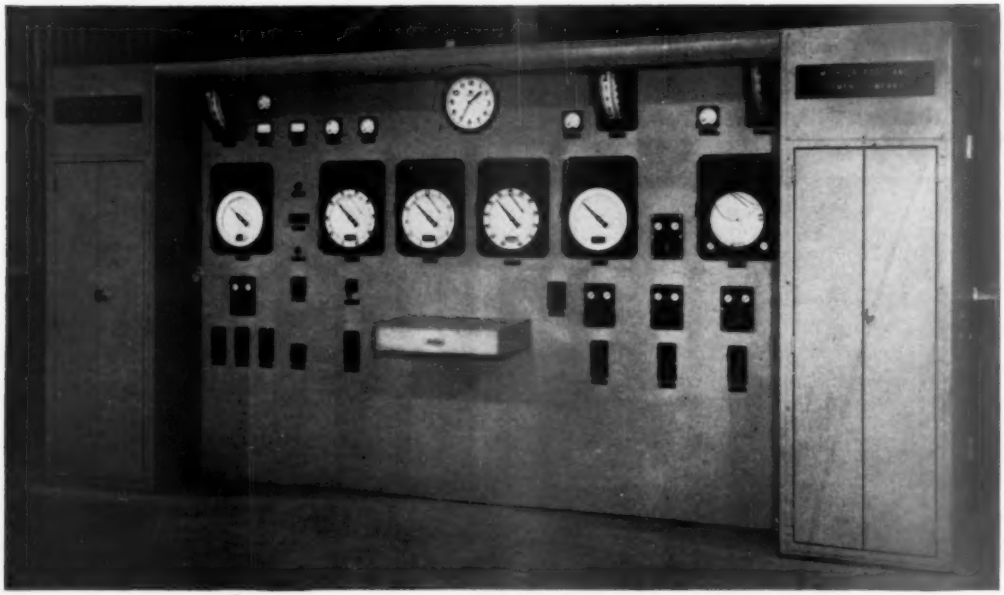


"KOEHRING WORK CAPACITY"

Ask your Koehring Distributor for specific information

KOEHRING HEAVY DUTY

7¾ to 79½ TONS lift capacity . . . ⅛ to 2½ yards dipper capacity



Main Panel Board for control of 3000 bbl per day Kiln at Missouri Portland Cement Company, St. Louis, Missouri.

3 Ways Better

...Bailey Control for Rotary Kilns

Bailey Control for Rotary Kilns gives you better performance three ways:

1. Economical Operation
2. Uniform Quality of Product
3. Reduced Maintenance

These are advantages which can be achieved when all phases of kiln operation are coordinated to work together as a team. Here's how Bailey Kiln Control can help you get all three.

ECONOMICAL OPERATION

With Bailey Combustion Control you can be certain that you are getting maximum product for every unit of fuel you burn. Bailey Control closely guards the Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and the Temperature of Air for Combustion.

UNIFORM QUALITY OF PRODUCT

Bailey Instruments and Controls can help you achieve a uniform high grade product. Measurements of temperatures, kiln speed, combustibles content, and oxygen content can be transmitted to recorders on centrally located control boards like the one shown. There is no sacrifice of accuracy or speed of response. High temperature alarm contacts may also be provided with Bailey Pyrometers as a further aid in achieving optimum uniformity of product.

REDUCED MAINTENANCE

By maintaining uniform temperatures and excess air conditions in the kiln, Bailey Controls help to reduce to a minimum costly refractory repairs and wear and tear on auxiliary equipment.

Bailey Meter Company has a staff of engineers who are experts in the control of rotary kilns. Assure yourself of optimum kiln performance. Let one of these men help plan your Kiln Control System. P-22

BAILEY METER COMPANY

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Controls for Processing

TEMPERATURE FLOW
PRESSURE LEVEL
% OXYGEN DENSITY
% COMBUSTION RATIO

Big and Strong... Better than Ever... MARION 111-M



Machine illustrated has Diesel power with electric swing. Also available as full Ward-Leonard Electric machine.

MARION gave the industry a new conception of excavating equipment in 1946 when the MARION 111-M was introduced. Here was a 3½-4 cu. yd. machine with all of the benefits of Diesel power PLUS all of the advantages of electric swing. Big enough for high daily yardage, yet easily moved from one job to another. Power enough to stand up to big jobs without flinching. Heavy enough to be steady on its long, wide crawlers.

Now—the MARION 111-M is bigger and stronger—better than ever. It is a thoroughly field-proven machine, piling up performance records that are truly impressive. (Write for copies of letters from 111-M owners.)

Regardless of whether you have seen the MARION 111-M before, you should see it today if a 3½-4 cu. yd. machine has a logical place in your operations. It's a rugged, heavy machine as a shovel or dragline with power and strength to spare.

The 111-M is an important new tool for heavy-duty material handling. Get the full story from your MARION representative or write to the factory for information.

MARION POWER SHOVEL CO.
MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

from 3/4 cu. yd. to 48 cu. yds.

Norblo



For Bigger Profits in Rock Products

Shown above are the three distinct types of Norblo Dust Collector equipment widely used in the rock products industries.

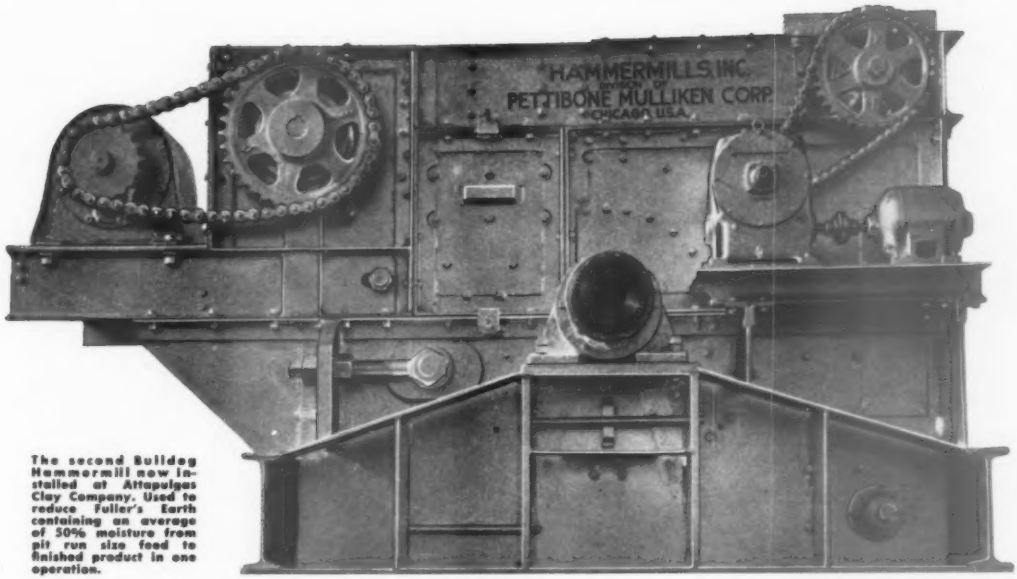
In crushing, drying, handling processes, Norblo Hydraulic and Norblo Centrifugal Dust Collectors used in combination are increasing production and lowering costs. Where salvage is usable or valuable select Norblo bag type dust collectors. These include Standard for intermittent service; Automatic for continuous and heavy duty service.

Write for Bulletin 104-2 covering the automatic and centrifugal types; Bulletin 164-2 covering bag types.

THE NORTHERN BLOWER COMPANY

Engineered Dust Collection Systems for All Industries

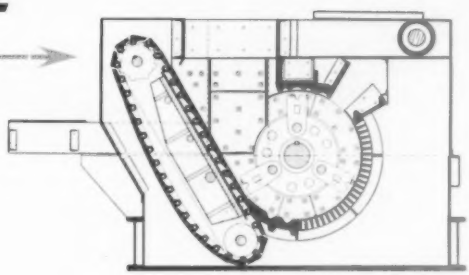
6408 BARBERTON AVE. • CLEVELAND 2, OHIO



The second Bulldog Hammermill now installed at Attapulgus Clay Company. Used to reduce Fuller's Earth containing an average of 50% moisture from pit run size feed to finished product in one operation.

BULLDOG HAMMERMILL

with Moving Breaker Plate



For wet, sticky material reduction . . . for those tough, heavy-duty crushing jobs.

Illustrated above is the last word in Moving Breaker Plate Hammermill design. It is built by an engineering organization whose experience far surpasses any organization that might furnish Moving Breaker Plate crushing equipment.

Design Improvements have increased reduction efficiencies and lowered H.P. requirements. You can see this equipment in operation at any time. Also Hammermills will gladly survey your reduction requirements and recommend the proper equipment without cost or obligation. Just write or call.

Bulldog Hammermills are built in capacities up to 1000 tons per hour for every purpose: for primary, secondary, fine reduction of materials such as limestone, shale, Fuller's Earth, phosphate muck, phosphate mud balls, iron ore, oyster and clam shells, any reducible material.

HAMMERMILLS, INC., division of **PETTIBONE MULLIKEN CORPORATION**

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FOR FASTER DRILLING



AT ANY ANGLE

The fast drilling speed and ease of handling which have made the G-150 Light WAGON DRILL so popular in the construction field, are equally advantageous in quarrying operations. Its compact cone gear feed, with 66% more tooth contact than conventional worm gearing, assures longer service life.

Using the G-150 with the 59-pound CP Sinker, or the 3-inch CP Drifter, the footage in benching, breasting, or toe-holing can be increased up to 100% over hand-held methods. 6-foot steel changes materially increase actual throttle time.

Holes are drilled easily at any angle. Positive uniform feeding pressure permits faster unit drilling speed with lower air consumption per foot drilled. The powerful steel puller avoids wrenching of steel and loss of holes in bad drilling ground.

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Never-Anywhere— A WHEEL LOADER LIKE THIS!

Smooth, continuous crowding action with
HYDRAULIC TORQUE CONVERTER DRIVE

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No gear shifting on most loading jobs with *specially designed*
CLUTCH-TYPE TRANSMISSION



model TL-10
TRACTOLOADER

Completely New . . .
Heavy-duty throughout

Hydraulic operated bucket — 3/4-cu. yd. (standard). Other buckets and interchangeable attachments available.

Allis-Chalmers gasoline engine, 40.5 brake hp.

Four forward speeds — 1.9 to 18 mph. Four reverse — 3.5 to 28.5 mph.

Weight — 10,650 lb.

Maximum clearance under bucket hinge — 9 ft. 10 in.

STEADY FLOW OF POWER TO DRIVE WHEELS

Torque converter drive automatically balances speed and power against load . . . crowds steadily, surely as it moves into pile . . . no engine stalls. Practically eliminates wheel spinning, reduces tire wear.

NO CLUTCHING WHILE LOADING

Operator uses only foot throttle and bucket levers to get his load. Torque converter action eliminates butting and ramming . . . reduces shock and clutch wear.

LOADS IN HIGHER GEAR

Even under unusually tough conditions, the TL-10 handles the job in second gear from start to finish — speeds work cycle and output.

LOADS BUCKET FASTER

No stop-and-go loading. Torque converter is constantly and automatically adjusting forward speed against loading resistance.

BUCKET OVER DRIVE WHEELS

utilizes weight of loaded bucket for greater traction . . . eases weight on rear steering wheels for fast maneuvering. **Turning radius is only 11 ft. at tip of bucket . . . works where smaller machines are normally used.**

● ***Get the full story from your Allis-Chalmers Dealer***



SINGLE LEVER CONTROL
. . . push for forward, pull for reverse

Two multiple disc clutches are built right into the transmission. One is for forward, the other for reverse. Both are operated by simply pushing or pulling a single lever. Reverse is almost twice as fast as forward.

Nation-Wide Sales and Service
THROUGH ALLIS-CHALMERS INDUSTRIAL TRACTOR DEALERS

TRACTOMOTIVE
TRACTOMOTIVE CORPORATION · DEERFIELD, ILLINOIS

What's U. S. Rubber doing about rock haulage?



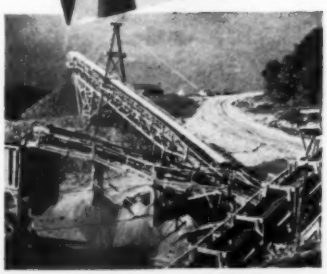
"U. S." is helping to increase the output of rock quarries, by developing conveyor belts which can handle greater loads with lower upkeep costs.

All the belts shown in these pictures of a Kentucky quarry were designed by United States Rubber Company engineers in cooperation with the quarry and equipment engineers. The ultimate result is a lowering in the quarrying cost and a rise in production—a familiar "U.S." story in every branch of industry.



These three U.S. Giant Conveyor Belts have been carrying the plant's output for 5 consecutive years.

This is the main conveyor belt, 1400 feet long. It carries the stone from the stock pile to shipping point.



These 3 belts complete the 100% U.S. Rubber Conveyor Belt installation in the quarry.

PRODUCTS OF U.S. RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Save Running Time

Speed is essential if trucks are to make deliveries on time. But speed alone won't do the job. Power is also necessary to prevent delays in getting away under full loads, climbing grades, pulling out of tough spots.

Eaton 2-Speed Axles provide drivers with both speed *and* power. This is made possible by the two gear ratios which Eaton provides for every conventional one. From "low low" to "high high" the Eaton driver can quickly find the most efficient gear ratio to deliver pulling power when needed, speed when desired. The result is faster running time.

And, exclusive Eaton features assure longer axle life. Your truck dealer will gladly explain Eaton's planetary gearing, positive lubrication, and other outstanding features.

EATON
2-Speed Truck
AXLES





Axle Division

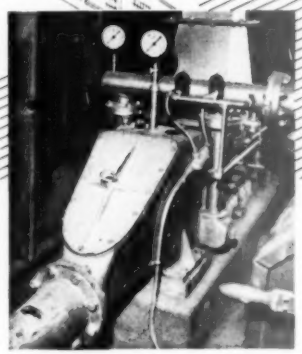
EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

40% more handling capacity





Materials are unloaded (P-1) from hopper-bottom cars to a Fuller-Kinyon Pump, and conveyed through the use of a two-way diverting valve (V-1) and V-2) direct to process bins (B-1) or to reserve storage bins (B-2). A second Pump (P-2) conveys materials from the storage bins to process bins. A Fuller Rotary Single-stage Compressor (C-1), 282 cfm., 25 psi., furnishes the necessary air.

WITH A FULLER-KINYON CONVEYING SYSTEM

Flintkote's asbestos shingle plant at East Rutherford, N. J. uses great quantities of Portland cement and other pulverized material. Unloading and in-plant moving of these raw materials was one of the costliest handling jobs the company had.

That is, until a Fuller-Kinyon Conveying System was installed. Flintkote's been profiting from that investment ever since! Before, three men and a truck driver were needed to unload one railroad car. *NOW one man controls the whole system.* Before, bulky sacks and skids took up badly *needed room. NOW 3200 square feet of former storage space is available for other purposes.* The new system has increased handling capacity 40 percent . . . nearly paid for itself in just three years!

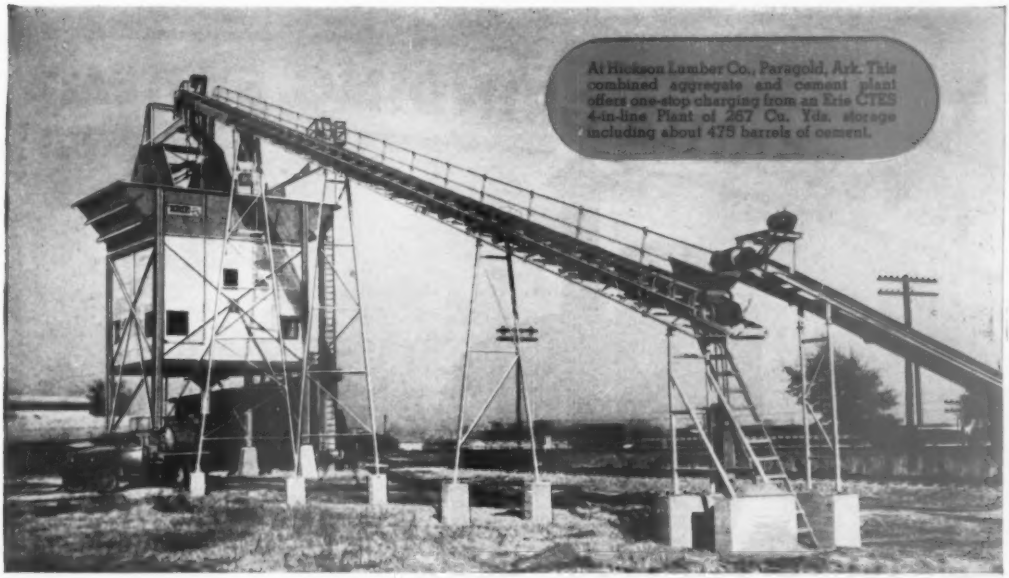
Your plant may be equally adaptable to efficient pneumatic unloading and conveying. Why not have our engineers analyze your requirements . . . recommend the most efficient and economical system. No obligation, of course.

fuller

FULLER COMPANY, Catasauqua, Pa.
Chicago 3 • 120 S. LaSalle St.
San Francisco 4 • 420 Chancery Bldg.

DRY MATERIALS CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT

P-125



At Hickson Lumber Co., Paragold, Ark. This combined aggregate and cement plant offers one-stop charging from an Erie CTES 4-in-line Plant of 267 Cu. Yds. storage including about 475 barrels of cement.

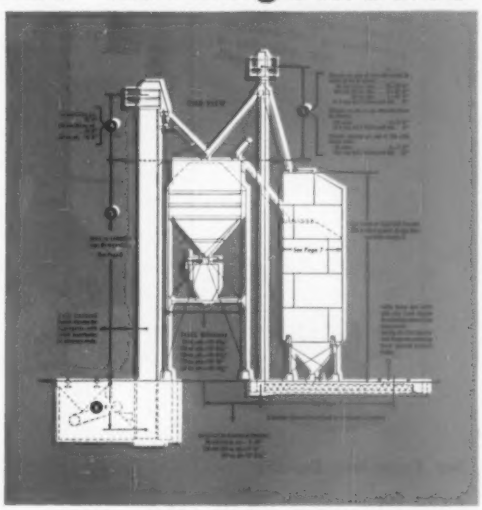
ERIE C-S SERIES *Combination* BINS

Offer 10 Compartment Arrangements

These Combination Aggregate and Cement Bins are of the knock-down semi-portable type. We build them in standard sizes with either 3 or 4 compartments in line. To meet special storage conditions we also build C-S Combination bins in 10 different top partition arrangements that provide almost any degree of material classification.

The advantage of having up to 475 barrels of cement alongside aggregates in one bin makes for economy and fast one-stop charging of materials. Auxiliary connected cement storage may be provided by the addition of Ground Storage Bins.

For extra high truck clearance required of large Central Mixing Plants or Concrete Products Plants 11 ft. additional column height, over the standard 20 1/3 feet, is available.



Arrangement of Erie C-S Series Combination Cement and Aggregate Bin with auxiliary Erie Silo-type ground storage of cement interconnected to main plant.

WRITE FOR BULLETIN **C-S**

ERIE

STEEL CONSTRUCTION COMPANY

716 GEIST ROAD • ERIE, PENNSYLVANIA

A VERSATILE GRINDING SYSTEM



RAYMOND HIGH SIDE ROLLER MILL

PNEUMATIC FEED CONTROL
. . . is a "production booster" that keeps the mill operating at peak capacity . . . prevents underfeeding and overfeeding . . . and maintains a maximum "load" on the mill.

WHIZZER SEPARATOR
is built integrally with the mill and driven independently. One simple adjustment controls the fineness over the full range of classification.

AUTOMATIC FEEDER
Used on all of Raymond Roller Mills. Speed of feed roll automatically controlled from the mill system.



Raymond Roller Mills also built in Low Side Type for coarser grinding operations.

For Complete Details write for
RAYMOND CATALOG No. 61



COMBUSTION
Raymond
PULVERIZER DIVISION

for

NON-METALLIC MINERALS

From a Few Tons . . . .
To 30 Tons or More per Hour

Combining All Operations in One Unit

The Raymond High Side Roller Mill with whizzer separator provides a complete automatic pulverizing system for economical production of most nonmetallic minerals in the fineness range from about 60% passing 100 mesh to 99.9% through 325 mesh. Its convenient fineness control—merely changing whizzer speed—makes producing different grades of material on one Mill a simple matter.

The product is handled in an enclosed, dustless system from feed hopper to finish bin. There is no wasted material and rehandling costs are saved.

The whizzer principle assures high efficiency air separation and consistent uniformity of finished product.

New type feed control maintains maximum output and peak efficiency of the mill under all conditions, insuring highest tonnage rates per horsepower.

Flash Drying can be combined with grinding at great savings both in time and equipment.

Extra rugged construction of the best available materials and self-lubricating oil journals contribute to long service life and maintenance economy.

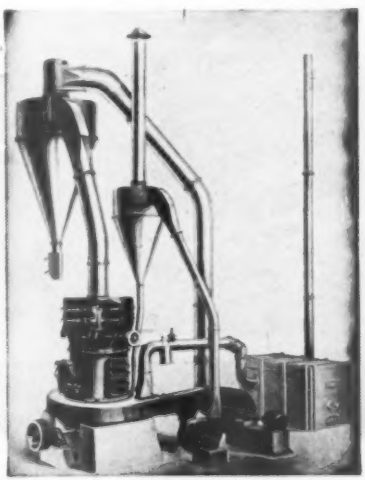
Partial List of Products pulverized on RAYMOND ROLLER MILLS

LIMESTONE
GYPSUM
KAOLIN
CLAYS
BENTONITE
DOLOMITE
PHOSPHATE ROCK
FULLERS EARTH
BARYTES
BAUXITE
MAGNESITE
MARBLE
SULPHUR
TALC

If you have a special problem in fine grinding, write for information on Raymond Mills.

Equipped with Flash Drying Accessories

The Roller Mill with Flash Drying System can handle many materials containing as high as 10% to 15% initial surface moisture — reducing the moisture content while pulverizing, and producing a fine, dry, free-flowing product.

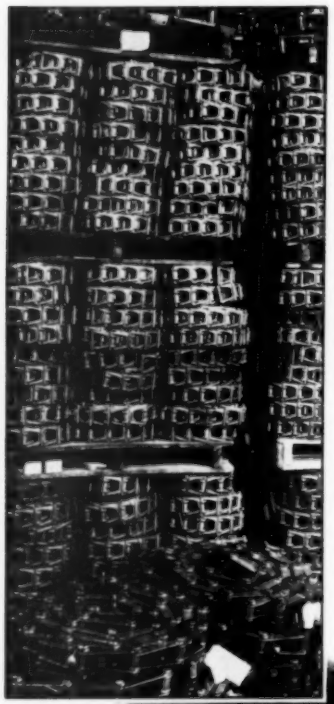


ENGINEERING-SUPERHEATER, INC.

1307 NORTH BRANCH ST. **CHICAGO 22, ILLINOIS**

Sales Offices in Principal Cities

CHAINS *from* STOCK



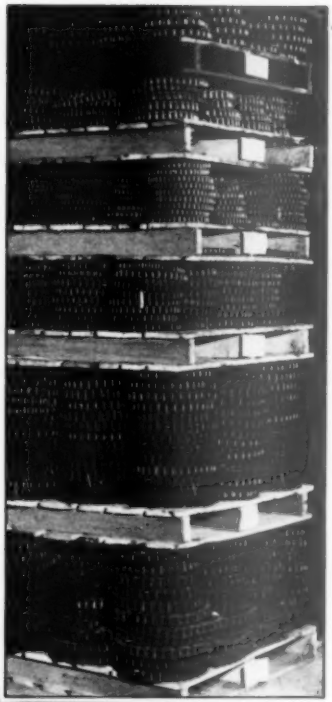
Popular types and sizes available at once from Columbus—from our distributors in all industrial centers

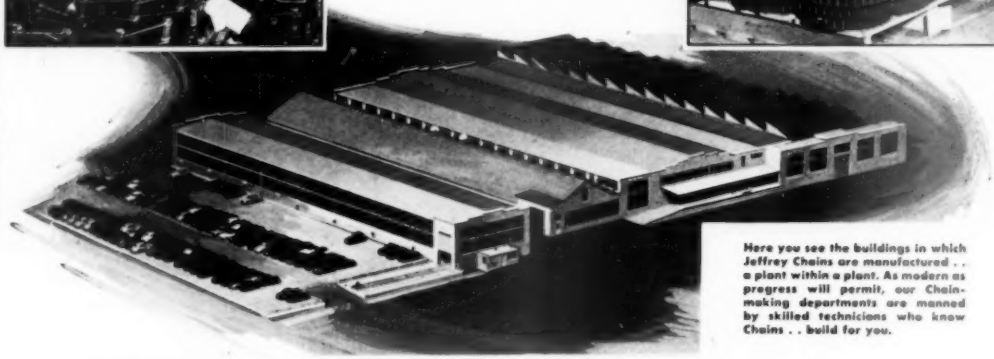
NEED CHAINS? We can ship immediately from our large stock here at home or you can contact any one of our authorized Stock-carrying Distributors, strategically located throughout the United States to better serve your needs.

Our recently-enlarged Chain-making establishment (see photo below) is fully equipped with new high-speed tools . . every modern facility to make chains scientifically better . . faster.

A large assortment of Sprockets, Gears, Pulleys, Babbitted Bearings and other Transmission items are also available for prompt shipment, as well as a line of Spiral Flights, Belt Idlers, etc.

We will be glad to take care of your requirements . . will handle those "Ship At Once" requests promptly. May we hear from you?





Here you see the buildings in which Jeffrey Chains are manufactured . . a plant within a plant. As modern as progress will permit, our Chain-making departments are manned by skilled technicians who know Chains . . build for you.

THE JEFFREY MANUFACTURING COMPANY

Established 1877

939 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2	Chicago 1	Detroit 13	Jacksonville 2	Pittsburgh 22
Birmingham 3	Cincinnati 2	Harlan	Milwaukee 2	St. Louis 1
Boston 16	Cleveland 13	Houston 2	New York 7	Salt Lake City 1
Buffalo 2	Denver 2	Huntington 19	Philadelphia 3	Scranton 3

Jeffrey Mfg. Co., Ltd., Head Office & Works: Montreal

Progress Reports Reveal Faster Progress

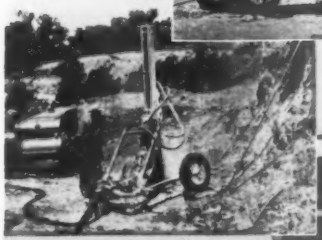
when *Gardner-Denver's* in your picture!



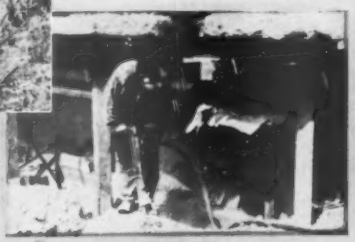


***Air pressure's always up*—when Gardner-Denver Portables feed your lines. Cylinders are water-cooled all the way down for all weather efficiency—compressors are two-stage for any altitude performance.**





***Holes are spotted quickly*—drilled fast and clean with Gardner-Denver Wagon Drills.**

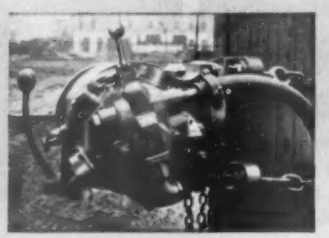


***Demolition proceeds at a steady pace*—Gardner-Denver Breakers are easy on the operator—tough on concrete.**



***A clean hole drills faster*— and Gardner-Denver Sinkers are noted for hole cleaning ability, powerful rotation.**





***For speedy pull and haul*—powerful Gardner-Denver Air Hoists are easy to control.**



***Saves shop time for all pneumatic tools*—L012 Automatic Oiler shuts off air when it runs out of oil.**



***Keeps water out of your way*—Top-Suction VP4 Sump Pump won't burrow in the mud—keeps grit out of the pump shaft seal.**

Write for further information.



***Packs backfill swiftly and firmly*—Gardner-Denver Tampers are easy to hold—seldom require maintenance—non-freezing.**

***Clay or hardpan doesn't waste time*—when tackled with Gardner-Denver Clay Spaders and Trench Diggers.**

SINCE 1859

GARDNER-DENVER

THE QUALITY LEADER IN PUMPS, COMPRESSORS AND ROCK DRILLS

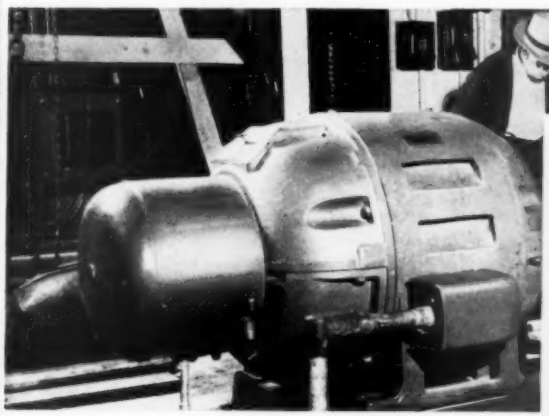
Gardner-Denver Company, Quincy, Illinois

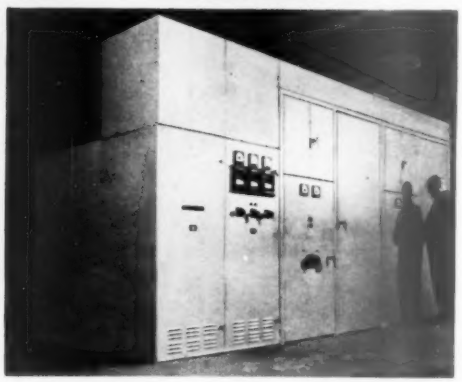
In Canada:

Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

DEPENDABILITY where it counts

SYNCHRONOUS MOTORS

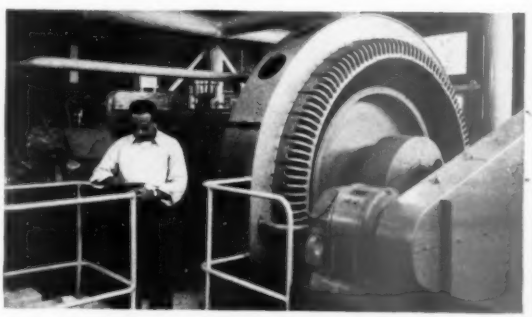




Dependability and long life are a must in water-pumping equipment. Cohoes, N. Y. selected a G-E Tri-Clad* 500-hp synchronous motor for their raw-water pumping station. And as protection against a short-circuit capacity of 60,000 kva, Cohoes selected G-E Limitamp high-voltage control. Besides providing accurate control for the motor, Limitamp clears shorts from the line in less than half a cycle—before damage can come to either motor or control. Ask your nearest G-E sales office for more information on Limitamp control.

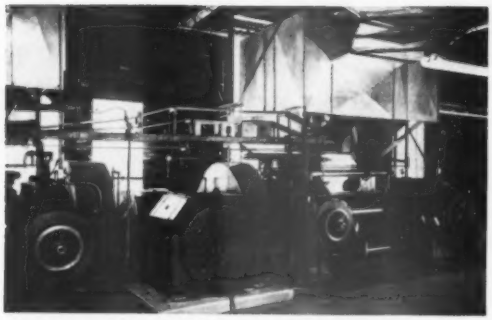
* Reg. U. S. Pat. Off.

ON CRITICAL PUMPING OPERATIONS

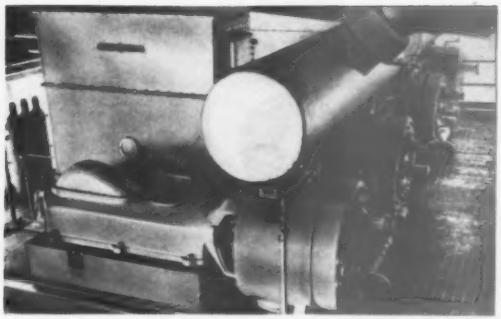


Driving compressors in gas pumping station serving hundreds of homes, motor requirements were—dependability and low cost. This G-E 1500-hp synchronous motor scores on both counts.

FOR SPECIAL SERVICE CONDITIONS

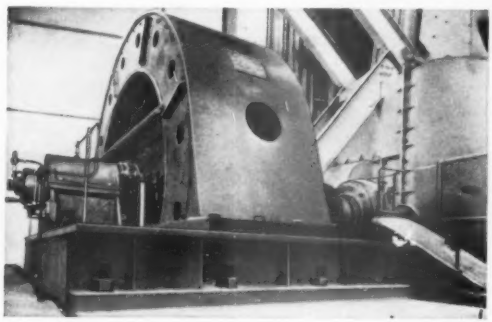


Corrosive, dust-laden atmosphere has no effect on this externally ventilated synchronous motor. Installed in a plastics mill, it's typical of the special enclosures that can be designed to meet almost any operating problem.

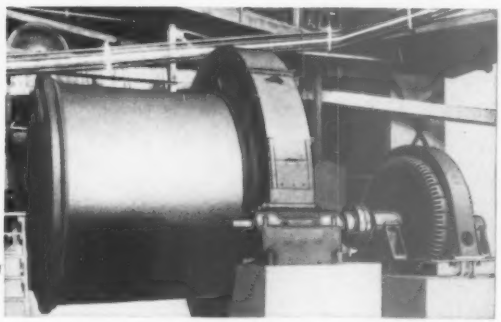


These gas compressors created a hazardous atmosphere for motor operation. The external enclosure of this 300-hp, G-E synchronous motor is filled with an inert gas to provide reliable operation.

FOR TOUGH JOBS



A motor must be rugged to drive a large wood chipper capable of chewing 40-inch diameter logs into small pieces. This G-E synchronous motor, with rigid, box-type construction will give years of dependable service—on a tough application.



To meet the rough test of driving a ball mill, this mining company chose a G-E high-torque synchronous motor rated at 600 hp. It's given them years of dependable operation and still going strong.

SAVE MONEY, TOO

It's a fact . . .

Lower Operating Costs,
higher operating efficiency.

Lower Initial Cost
including control and exciter—for many ratings.

Reduced Demand
and release of needed generating capacity.

Reduced Power Rates
for improved power factor.

Application engineers, with many years of field experience, will tailor G-E synchronous motors and control to *your* job. And, no matter where you are located, there's a G-E Service Shop near you.

For your next large, synchronous motor application, call in your General Electric representative—he'll be glad to discuss with you, your particular application. For more information on G-E synchronous motors, write for GEA-5332 (low-speed) or GEA-5426 (High-speed) to: *Section 770-24, General Electric Company, Schenectady 5, New York.*

You can put your confidence in—

GENERAL ELECTRIC

770-24

The Sign That Means

OUTPUT



There's good reason why Bucyrus-Erie shovels are preferred in mines and quarries throughout the world, and that reason is — output. For no other excavator quite matches the speed, precision and smoothness of Bucyrus-Erie Ward-Leonard electric control, or the simple, well-balanced *years ahead* design that means faster cycles and greater production every shift. No other excavator quite equals Bucyrus-Eries in ability to stay on the job for dependable service year after year. And no other excavator is built with more careful selection of quality materials, finer craftsmanship or longer practical field experience representing nearly 71 years of continuous leadership in the design and manufacture of excavating machines.

B1L49

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN



Choose Chase for all 5 features

Having the right bag for your product is an important decision that should not be left to chance. Chase Bags are designed to provide protection, they are good-looking, they will help increase sales! Your Chase Salesman is an expert in analyzing packaging requirements. He will be glad to specify the container which best meets your needs.

What I require when buying bags:
1. Strength and good looks...
2. Sharp printing...
3. Technically trained bag salesman...
4. Dependable source with long experience!
5. Bags designed to my product to increase sales!

Bags for all industry and agriculture

- cotton bags of all kinds
- paper and Multiwall bags
- Saxolin open mesh bags
- Topmill burlap bags
- combination bags, liners and specialties

CHASE since 1847 BAGS

for Better Bags... Better Buy Chase

CHASE BAG CO.

GENERAL SALES OFFICES: 309 W. JACKSON BLVD., CHICAGO 6, ILL.

BOISE • DALLAS • TOLEDO • DENVER • DETROIT • MEMPHIS • BUFFALO • ST. LOUIS • NEW YORK • CLEVELAND • MILWAUKEE
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OKLAHOMA CITY • PORTLAND, ORE. • REIDSVILLE, N. C. • HARLINGEN, TEXAS • CHAGRIN FALLS, O. • WORCESTER, MASS. • CROSSETT, ARK. • SAN FRANCISCO



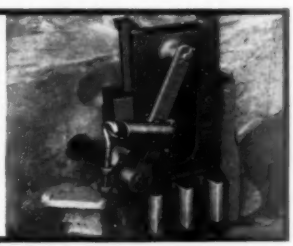
FOR PROFITABLE PERFORMANCE ON ANY ROADWAY JOB

A BAY CITY MODEL 59

Owners and operators everywhere, like the Norristown Hauling Company of Norristown, Pa., have found that they get more power . . . more weight . . . more stability and more work done every day with a big BAY CITY one-yard convertible shovel. Look at the "59" at work in the above photo. Look at the rugged construction . . . look at its size (it's really a modified 1¼ yard machine) . . . look at the many outstanding BAY CITY features and you'll see why you get higher performance at lower operating costs with a BAY CITY Model 59. See your nearest dealer or write us for full facts.
BAY CITY SHOVELS, INC., BAY CITY, MICHIGAN.

- ✓ CHECK LIST
- ✓ Fully Convertible
- ✓ Long, Wide Crawlers
- ✓ Alloy Cast Bases
- ✓ Tandem Drums
- ✓ Power Booster Clutches
- ✓ High Line Speeds
- ✓ Wide Vision Cab
- ✓ Pin-Connected Boom

This positive acting swing lock is just another example of thorough BAY CITY engineering on even the smallest details. The lock securely holds the machine from swinging when being transported or when moving on the job. It can be engaged with the cab in any position and has full 360° range.



185



BAY CITY



SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

WIRE ROPE



You PAY for the best . . . make sure you GET it . . always specify Roebling

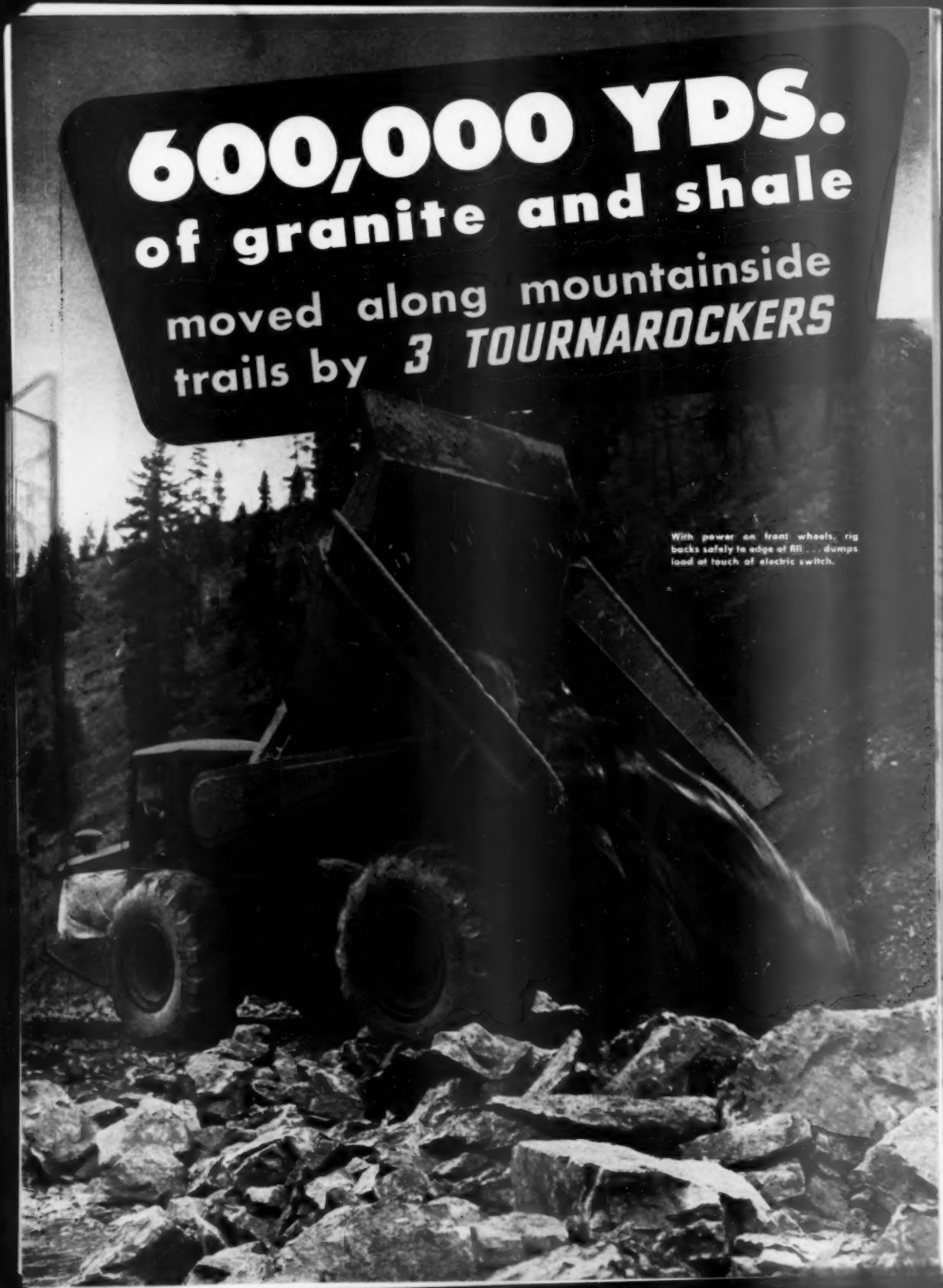
YOU PAY FOR THE BEST when you buy wire rope. And you *get the best* when you buy Roebling Preformed "Blue Center" Steel Wire Rope. "Blue Center" steel is an exclusive Roebling product . . . gives rope the extra toughness that spells long life . . . service economy that really counts. Besides that, Roebling Preformed can be cut without seizing . . . always spools better . . . reduces vibration and whipping . . . doesn't tend to set or kink.

Roebling makes a wide range of wire rope . . . brings you the right construction, grade and size for top performance and economy on each installation. Have your Roebling Field Man help select the *best* rope for your particular requirements. And for maximum savings, get his suggestions on the proper use and maintenance of wire rope. He knows the case histories of thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

Atlanta, 934 Avon Ave ★ ***Boston,*** 51 Sleeper St ★ ***Chicago,*** 5525 W. Roosevelt Rd ★ ***Cincinnati,*** 3253 Fredonia Ave ★ ***Cleveland,*** 701 St. Clair Ave, N.E. ★ ***Denver,*** 4801 Jackson St ★ ***Detroit,*** 915 Fisher Building ★ ***Houston,*** 6216 Navigation Blvd ★ ***Los Angeles,*** 216 S. Alameda St ★ ***New York,*** 19 Rector St ★ ***Odessa, Texas,*** 1920 E. 2nd St ★ ***Philadelphia,*** 230 Vine St ★ ***San Francisco,*** 1740 17th St ★ ***Seattle,*** 900 1st Ave, S. ★ ***Tulsa,*** 321 N. Cheyenne St ★ Export Sales Office, ***Trenton, N. J.***

600,000 YDS. of granite and shale moved along mountainside trails by 3 TOURNAROCKERS



With power on front wheels, rig backs safely to edge of fill . . . dumps load at touch of electric switch.

252 yds. hourly on 2400′ cycles is typical fleet production for *Roy L. Bair Co.*

As an example of Tournarocker's ability to handle ore and rock in mine and quarry check the following production figures on a tough road-building assignment. To eliminate the treacherous "Camel's Hump" on U. S. 10 between St. Regis and Cabin City, Montana, Roy L. Bair Co., of Spokane, Wash., is using 3 rear-dump, 16-ton C Tournarockers to haul 600,000 of an estimated 1,200,000 cu. yds., under conditions that are really rugged.

Shovel-loaded in 2 min. 9 sec.

Material is mostly tough clay-seamed shale, with a large percentage of granite boulders and some gravel. Tournarockers are loaded in 5 to 6 passes by a 2½-yd. shovel in an average of 2.15 minutes. Despite high voids, loads average 10 to 11 pay yards each.

Tournarockers are constantly working in restricted mountainside cuts, hauling at 3900′ altitudes along steep canyon sidewall roads, and dumping over sheer banks. Always narrow and winding, the clay-surfaced trails are often made slippery by heavy rains.

Fleet output 25 loads hourly

Under these tough conditions, the 3 Tournarockers deliver an average of 25 heaped loads hourly on 2400′ cycles — a total of 252 pay yards an hour, or approximately 363 tons of the 2880-lb. material.

Get Tournarocker estimate

These production figures from the "Camel's Hump" job are typical of field evidence coming in daily, showing how C Tournarockers all over the country provide lowest cost per ton hauling. Your Le-Tourneau Distributor has more job-proved facts and figures on the *new* 18-ton "C" that will interest you. See him today!



Low entry from rear . . . plus big 12′4″ x 8′ top opening . . . speeds shovel loading of big-chunk granite rock.



Carrying granite boulders, 16-ton, 186 h.p. C Tournarocker hauls approximately 1200′ one way to dump area. Three of these electric-control "C's", 2 veteran Super C Tournarockers, 2 tractor-drawn W Carryalls and a LeTourneau Booster are handling 90% of Bair's 1,200,000-yd. realignment job.



Tournarocker makes 90° turn within 14′ radius . . . moves quickly into loading position under 2½-yd. rock shovel. Including all turns and spotting time, total 2400′ cycle averaged 6.25 min. (2.15 min. to load, 1.95 min. to haul 1200′, 0.3 min. on dump, 1.85 min. to return 1200′).

Tournarocker, Booster Trademarks Reg. U. S. Pat. Off. — Tournarocker Trademark ©1954

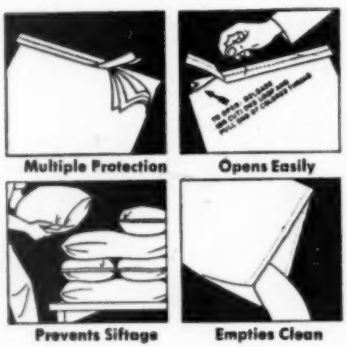
R. G. LeTOURNEAU, INC.

PEORIA, ILLINOIS

HIGH-SPEED, RUBBER-TIRED EXCAVATING • HAULING • LIFTING EQUIPMENT



The time has come the Walrus said To talk of many things of Ships and Planes...Production Pains and everything it brings



"EVERYTHING," in the national emergency, can include whatever you make and ship. Overnight it might mean changes in type of design of your containers.

So the Union Multiwall Specialist (the Walrus, if you like) is ready to help you meet any such problem.

When you invite a Union Multiwall specialist to study your packaging, there's no obligation of any kind. But now, more than ever, you'll find his packaging engineering know-how valuable to you.

Better be safe . . . better be sure . . . better welcome the Union representative when he calls!

UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK

Offices in: CHICAGO, ILL. • MINNEAPOLIS, MINN. • KANSAS CITY, MO. • HOUSTON, TEXAS • BALTIMORE, MD. • ATLANTA, GA.

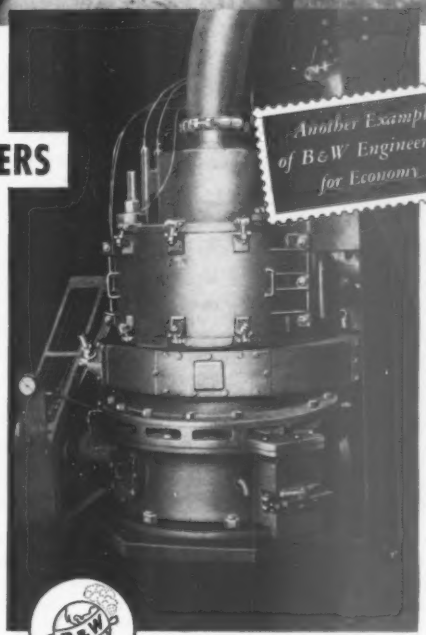
all 3

AT BUCKITE REFRACTORIES



direct-fired by

B&W PULVERIZERS



Another Example of B&W Engineering for Economy

Buckite Refractories, Inc., Woodville, Ohio, uses B&W Pulverizers to get maximum production from each of its three rotary kilns. Newest and largest of these kilns, an 8-ft. 6-in. by 160-ft. unit, is direct-fired by a B&W Type E-26 Pulverizer. This new kiln has increased Buckite's total production 60 to 65 per cent. Fuel economy has consistently exceeded expectations.

B&W Pulverizers employ the ball-bearing grinding principle. Coal of uniform fineness, consistently delivered at a uniform rate, is the result. High availability, low maintenance costs, and close, one-point control of coal-air ratio and volume are additional features of B&W installations. B&W coal pulverizing equipment assures long-lasting, dependable service for any type or size kiln. The Babcock & Wilcox Company, 85 Liberty Street, New York 6, N. Y.

B&W

BABCOCK & WILCOX

C-W

Barber-

MODEL 374

HEAVY-DUTY LONG-REACH PORTABLE CONVEYOR



ONE MAN

high-capacity loading, unloading, stockpiling of all bulk materials

Here is a pneumatic-tired portable conveyor with capacities from 150 to over 425 tons per hour. The B-G 374 can be towed from job to job, pile to pile, and has all the flexibility in use of smaller portable conveyors. It is built for heaviest service, yet one man can operate it to load, stockpile and unload far more tonnage per day than with any other truly portable conveyor. The 374 will handle sand, stone, wet concrete, coal—any bulk material—at a cost so low that every aggregate producer, contractor, City, County or State Highway Department handling large quantities of materials, should get the full details now on this new heavy-duty machine.

see your BG distributor

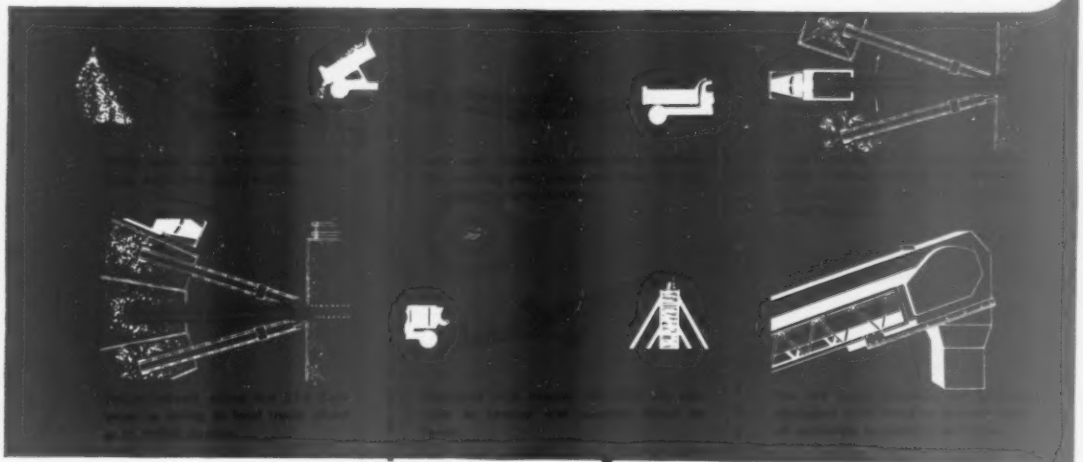
Greene

150 to 425 TONS/HOUR



VERSATILE...

Here are a few examples of what the 374 Conveyor, with its complete line of accessories, including feeders, vibrating screens, discharge spouts, loading hoppers, etc., can do for you in your heavy-duty bulk material handling operations.



189

send coupon for details

Available in belt widths of 18", 24" and 30", in lengths from 30' to 60', the 374 can be invaluable to you in these days of restricted manpower and the need for high production operations. Fill in and send this coupon for your copy of the 374 Bulletin.

BARBER-GREENE COMPANY
AURORA, ILLINOIS, U. S. A.

Barber-Greene Company
Aurora, Illinois

( ) Send bulletin on 374 Conveyor.

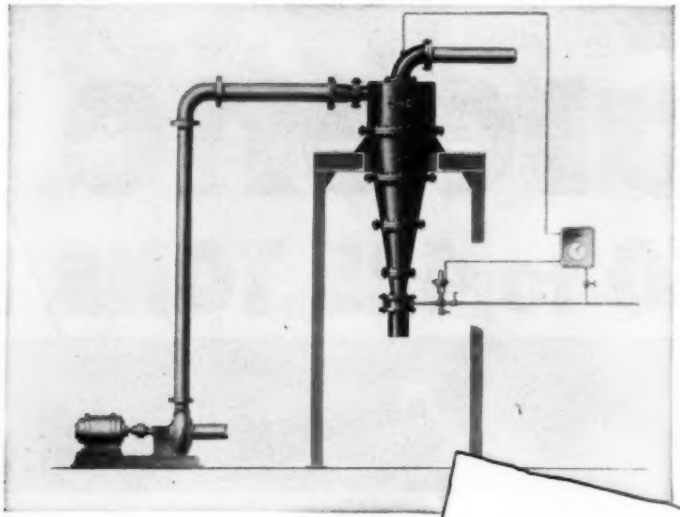
( ) Have representative call.

Name .....

Firm Name .....

Address .....

City ..... State .....



how good is a DorrClone* on desliming operations?

Results of independently run tests** on a 24" diameter DorrClone at a typical Florida phosphate rock washer show high recovery of wanted fraction—high elimination of slimes — remarkably constant discharge density.

PROBLEM

To desline minus 14 mesh washer debris for maximum recovery of plus 200 mesh material prior to concentration.

EQUIPMENT TESTED

24" diameter DorrClone equipped with Dorreo Vactrol* feature for automatic density control.

TESTING PROCEDURE

Cumulative samples of DorrClone feed, overflow and underflow taken on a half-hourly basis over a five-day period.

Summary of Cumulative Results

Cum. Sample Number	Sampling Period in Hrs.	Feed % Solids	Underflow % Solids	Overflow % Solids	Underflow +200 Rec.	Overflow −200 Elim.	Feed T.P.H.
#1	7.0	14.1	70.2	6.3	97.14	89.27	32.8
#2	3.5	22.1	69.8	5.8	93.88	97.07	36.9
#3	6.0	13.3	67.2	4.4	97.23	88.07	25.5
#4	5.5	28.7	76.6	5.1	97.55	93.24	41.4
#5	6.5	14.2	72.8	5.5	96.83	90.64	33.8

*DorrClone and Vactrol are trademarks of The Dorr Company.

**Name and location upon request.

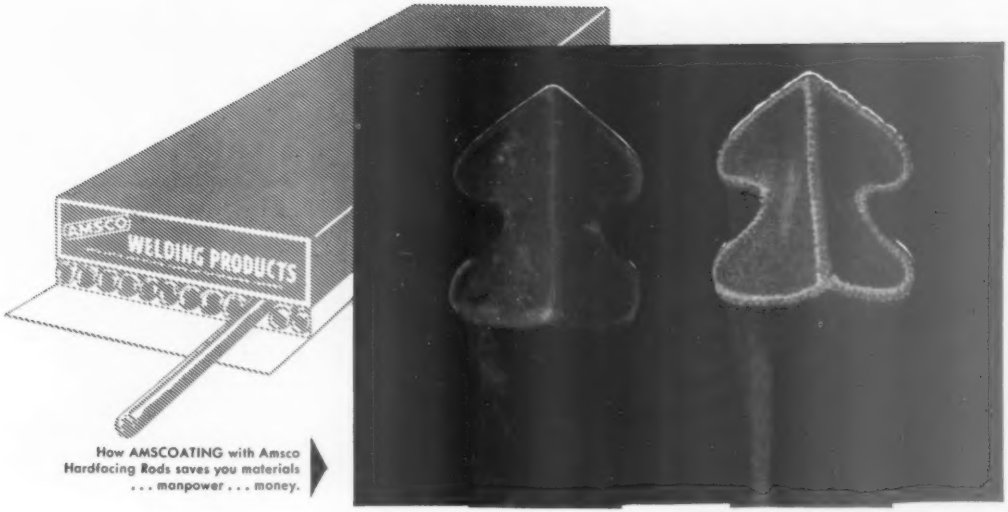
Regardless of material processed, the DorrClone can handle your desliming problem. Write to The Dorr Company, Engineers. Barry Place, Stamford, Conn., or in Canada to The Dorr Company, Engineers, 80 Richmond Street West, Toronto 1.

DORRCO

DORR

WORLD - WIDE RESEARCH · ENGINEERING · EQUIPMENT

THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.
Associated Companies and Representatives in the principal cities of the world



How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.

Why will ONE of these bits LAST TWICE AS LONG?

AMSCOATING...stands for control of wear by Hardfacing...

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

These bits are used by a Southern quarry for drilling blast holes. A combination of limestone and flint causes extreme abrasion—and a real problem of wear. In an attempt to cut replacement costs, labor and down-time, several makes of hardfacing rods were tried, but without much success.

Six years ago these bits were AMSCOATED with an Amsco® rod specially developed for combatting abrasion and impact.

Result? AMSCOATING did a job that had never been done before. The drill bits held their edges longer . . . averaged 60 hours of drilling—between regrinds—instead of 30. Maintenance costs and bit changes were cut in half!

AMSCOATING saves you money in terms of lower maintenance costs, less down-time . . . more production. *The actual on-the-job example cited above is one of the many applications that prove it!* Write today for illustrated catalog describing dollar-saving AMSCO rods . . . and the name of your nearest AMSCO distributor.

AMSCOATING

THE RIGHT WAY TO SAY HARDFACING

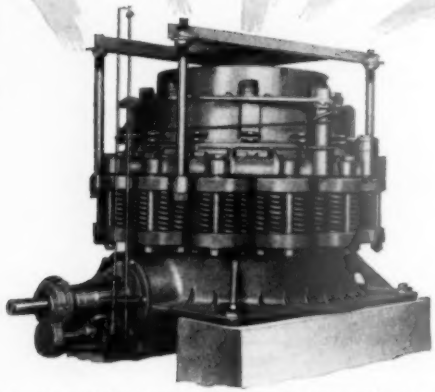
Brake Shoe | **AMERICAN MANGANESE STEEL DIVISION**

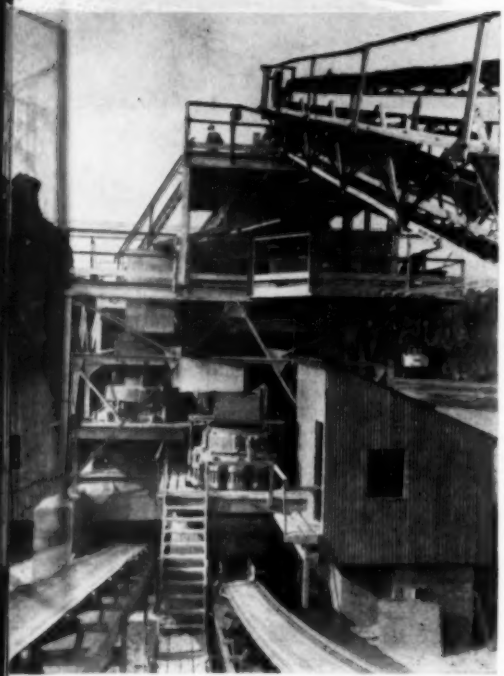
377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

Symons Cone Crushers

. . . UNSURPASSED For Fine Low Cost Crushing of GRANITE and TRAPROCK





Three Symons Cone Crushers (two 4-ft. and one 7 ft.) used in the secondary tower of the Kingston Trap Rock Co., Kingston, N.J. This is one of scores of similar Symons Cone Crusher installations.

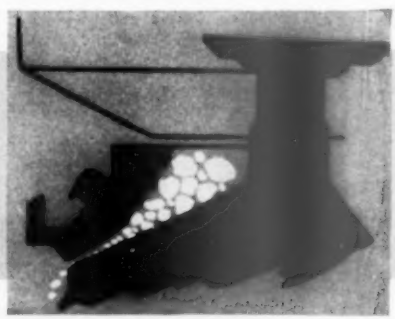
THE action of the Symons Cone Crusher makes it ideal for fine crushing of granite and traprock at low cost. Because of the rapid gyration and wide throw of the head the material being crushed receives a series of rapid hammer-like blows as it passes downward through the crushing cavity. Free fall of material between the timed series of sharp impacts — rather than the material just being "pinched" by a slow, short throw head—results in less wear from abrasion.*

The hundreds of Symons Cone Crushers being used by major producers of crushed granite and traprock are evidence that these Nordberg built crushers are unsurpassed for this hard, tough, abrasive rock.

Write for details on a size and type of Symons Cone Crusher to meet your specific requirements.

***MAXIMUM LINER UTILIZATION**

With the Symons process the crushing action occurs throughout the entire length of the cavity. The resulting uniform manganese wear means minimum scrap loss and low manganese cost per ton of crushed product.



NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
MEXICO, D. F. • LONDON • TORONTO • JOHANNESBURG

C251

NORDBERG

Machinery for processing ores and industrial minerals


PRIMARY CRUSHERS


VIBRATING BAR GRIZZLIES


ROD DECK SCREENS


GRINDING MILLS


MINE HOISTS


DIESEL ENGINES

Speed reduction problem?

Is it Ratio? Space? Shock? Overload?

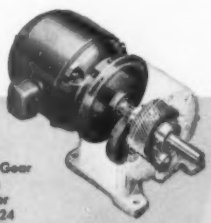
No *one* speed reducer solves *every* reduction problem. That's Why LINK-BELT Builds All THREE.

FOR the *right* speed reducer engineered to match your exact conditions, your best bet is Link-Belt. Link-Belt builds all three—Helical, Herringbone, Worm gear drives. When a Link-Belt power transmission engineer analyzes your problem, he isn't tempted to fit his recommendation to a limited line.

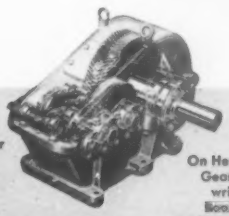
You can also be sure that the Link-Belt unit recommended is engineered and built for tough operating conditions. And efficiency in power transmission is matched by flexibility in application!



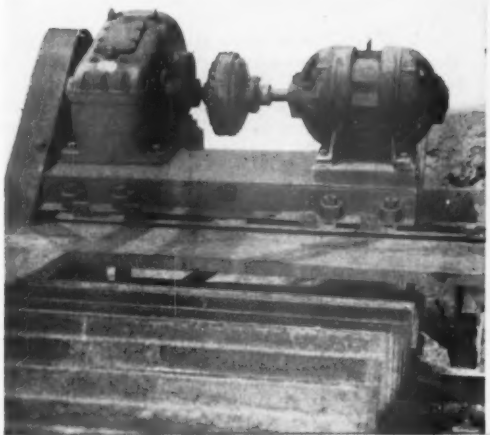
On Worm Gear Drives write for Book 2324



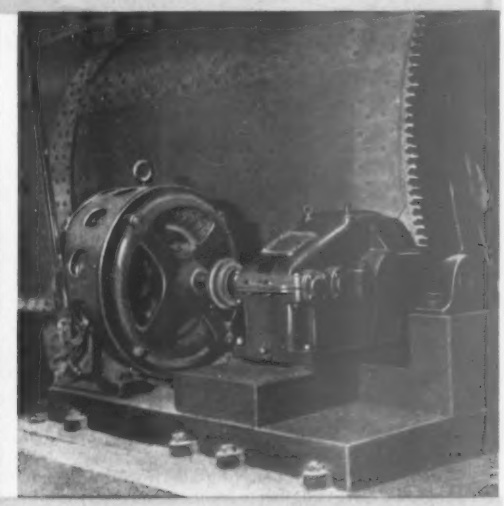
On Gearmotor and Helical Gear Drives write for Book 2247



On Herringbone Gear Drives write for Book 2419



Uniform, continuous service is assured for a sand dewatering flight conveyor driven by a Link-Belt Herringbone Gear Drive and Fluid Coupling.



This dependable, sturdily-built Link-Belt Herringbone Gear Drive provides constant-speed, uninterrupted operation for a rotary lime kiln.

LINK-BELT
ENCLOSED GEAR DRIVES

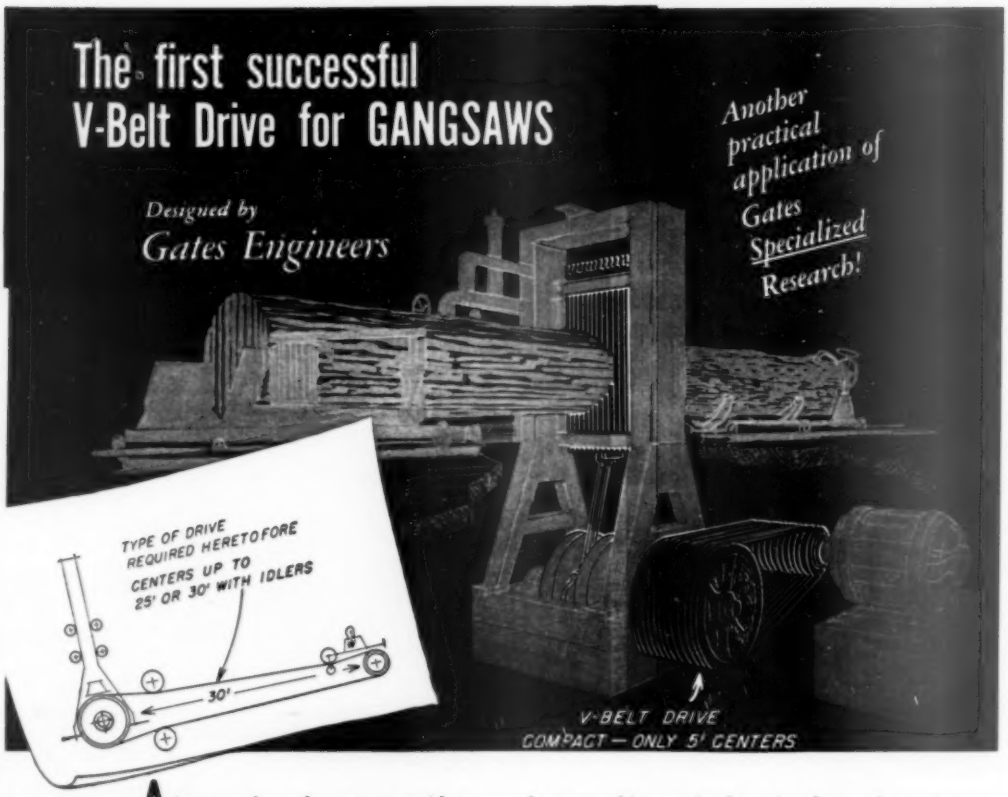
12,242-F

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.

The first successful V-Belt Drive for GANGSAWS

Designed by
Gates Engineers

Another practical application of Gates Specialized Research!



A large maker of gangsaws said to Gates Engineers, "If you can design a V-Belt drive to handle the *fluctuating load* on a gangsaw, we can discard the long and troublesome flat belt that we have always thought we had to use."

The *reasons* for his statement are quickly told:—

A gangsaw (or Swedish type Gang-Mill) consists essentially of several saw blades mounted in a heavy steel frame or "sash" that moves rapidly up and down like a monster jig saw. This sash may weigh a ton or more—yet it makes about *five* 24-inch *up* and *down strokes per second!*

On the *up* strokes, the saws have no cutting load on them. But on the *down* strokes they must often slash a log up to 36" diameter into 2" planks. This great unbalance in load between the *up* and the *down* strokes has heretofore defeated all efforts to apply a V-Belt Drive to saws of this type.

After thoroughly analysing the fluctuating load on gangsaws, Gates Engineers recommended very minor changes in design which would permit the application of V-Belts and—what is of *utmost importance to you*—they were able to write down *in advance* the exact specifications of the V-Belt Drive that has very successfully handled this extremely difficult assignment.

This *pre-solution* of drive design problems is possible because Gates operates the largest V-Belt testing Laboratories in the World—and Laboratory findings are carefully checked by tests made under actual field conditions. Finally, the *results* of these exhaustive tests are immediately reduced to *usable data* for the design of V-Belt drives to *perform whatever task may be required.*

Phone a Gates Field Engineer

If you have a difficult drive to design, or if some drive in your plant is giving trouble, or if you only want to be sure what size and construction of V-Belts will give the most efficient and the lowest cost service on any particular drive—you have only to phone a Gates Field Engineer, *always near you* in all industrial centers.

Just look in your phone book under "Gates Rubber." A Gates Field Engineer will come right to your plant and put at your service the full benefits of Gates V-Belt knowledge and experience *without the slightest obligation!*

ENG. 515

Gates
Hose V-Belts Molded Rubber Goods for Industry

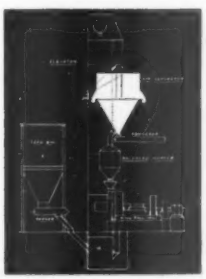
VULCO ROPE **DRIVES**

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

STURTEVANT AIR SEPARATORS



Produce Aggregates that meet Government Specifications



Sturtevant Air Separator in "closed circuit" with pulverizer. This combination increases tonnage and reduces costs in all types of industry.

RING ROLL MILL



Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

On dam projects throughout the country, Sturtevant Air Separators are helping contractors meet U. S. Corps of Engineers specifications for proper analysis of aggregates. Here's how — Sturtevant Air Separators de-dust and remove the fine fraction according to the mesh required. Dry or damp sand can be handled in any tonnage desired in ranges from 30 mesh and finer to eliminate screen in the production of intermediate sizes.

The de-dusted sand of proper mesh is then inter-blended with the screened sand or aggregates in the proper proportions providing aggregates that meet specifications.

Sturtevant Air Separators are fast and accurate. They increase production of aggregates, cut production costs.

Investigate Sturtevant Air Separators for your jobs. Write for details, today.

STURTEVANT MILL COMPANY

102 CLAYTON STREET, BOSTON 24, MASSACHUSETTS

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

SIMPLICITY SCREENS KEEP COSTS DOWN FOR CALIFORNIA SAND AND GRAVEL PRODUCER



Operating view of Torrance Sand & Gravel Co. installation in California.

Two Simplicity Gyrating screens keep production rolling for the Torrance Sand & Gravel Company in Torrance, California, and *take all kinds of material in stride.* In this installation a 4' x 14' Model D Triple Deck Screen scalps off rock ranging from 2" to 16" in size and removes all the minus ¼" material making concrete and plaster sand. All final gravel sizing and washing is done on a Simplicity 3' x 8' Triple Deck Screen.

Like Torrance Sand & Gravel, operators all over the country have found that Simplicity screens are better for sizing and dewatering because they are *big* for their size . . . *they give more screening area.* A 3' x 8' Simplicity actually gives 3' x 8'— 24 square feet — of live action area. Simple mechanisms mean minimum maintenance . . . famous gyrating action means more production of a quality product. Get the facts first about Simplicity for *screens that will last.* A Simplicity sales representative will be glad to give you the complete story. Write, wire or phone us at Durand.

90

- **Sales Representatives In All Part Of The U.S.A.**
- **For Canada:** Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario
- **For Export:** Brown & Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY, DURAND, MICHIGAN

Important points to know about COTTRELL *Electrical Precipitators*

A COTTRELL Electrical Precipitator is a major plant investment. Once installed it is operated over a period of many years, *thus multiplying year after year the benefits of top notch design and installation.*

And because of the many factors affecting the operating and collecting efficiency of a COTTRELL Precipitator, probably in no other field do the experience and "know-how" of the organization designing and installing the unit play a more important role in influencing the overall performance of the installation. That is why it is so important to remember this fact . . .

Western Precipitation Corporation is the organization that installed the first successful* COTTRELL *Precipitator over 39 years ago, still operating efficiently . . . and has consistently developed new refinements, new techniques, new applications that today have made it world famous in the science of recovering dusts, fly ash, mists, fogs and other suspensions from gases.

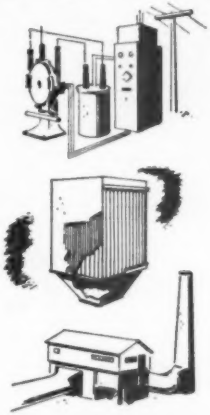
This is the first of a series of advertisements briefly outlining the important elements that go to make up a COTTRELL installation. Only long experience coupled with highest engineering ability, can assure the proper combination of these elements into a COTTRELL installation best suited to *your particular requirements*!

Basically, a Cottrell Precipitator consists of three major divisions each in turn consisting of many separate elements . . .

1. THE ENERGIZING SYSTEM, as its name implies, is the portion of the unit wherein the power is brought in, the voltage stepped up, then rectified to provide the unidirectional high voltage current supply for the Electrode System.

2. THE ELECTRODE SYSTEM consists of the high-tension ionizing electrodes and collecting electrodes through which the suspension-laden gas is passed to be cleaned. These electrodes can be of various designs, shapes and patterns and are equipped with various "rapper" arrangements which assist in keeping the electrodes clean of recovered materials.

3. THE HOUSING OR SHELL includes the structure containing the Electrode and Energizing Systems as well as the gas ducts and distributing system, the hoppers for receiving the collected material and other miscellaneous equipment.



Each of these three major divisions, together with their many individual parts, must be carefully engineered into ONE integrated and precisely-balanced unit to provide the successful and continuously-operating COTTRELL Precipitator. This series will take these major units apart to show in greater detail how the individual parts function and the varying types of design and construction. Watch for them.

10 COTTRELL ADVANTAGES

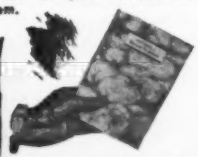
that make Cottrells unsurpassed for all types of recovery problems, hot or cold, wet or dry

1. **LOWEST DRAFT LOSS** —only a few tenths of an inch w. g.
2. **LOWEST POWER COST** —only ½ to 1 kwh. per 100,000 cu. ft. of gas cleaned.
3. **LOWEST MAINTENANCE COST**—all metal, few moving parts, no fire hazard.
4. **LOWEST LABOR COST** —operation can be fully automatic, if desired.
5. **LONGEST LIFE**—early Cottrell installation still operating after 39 years of continuous service.
6. **HIGHEST EFFICIENCY** —recovery efficiently approaches 100%, is desired.
7. **UNIVERSAL APPLICABILITY** —recover any suspension, solid or liquid—in any gas—over wide temperature ranges.
8. **ANY CAPACITY** — handle a few c.f.m.—or millions—with equal ease.
9. **MAXIMUM FLEXIBILITY** —readily adaptable to varying installation requirements.
10. **LOWEST OVERALL COST** —cost less per year of service, less per ton recovered. Often pay for themselves in a few months—always within a few years.

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1006 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 LaSALLE ST. BLDG., 1 N. La SALLE ST., CHICAGO 2 • HOBART BUILDING, SAN FRANCISCO 4, CALIFORNIA
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL



Do You Have This Helpful COTTRELL Booklet? In 28 pages of interesting charts, illustrations and descriptive data, it answers many of the questions engineers ask about COTTRELL design and construction. Send for your free copy. Ask for Bulletin C103!

PIT AND QUARRY QUIZ

Do you know how LORAINS can solve these problems for YOU?



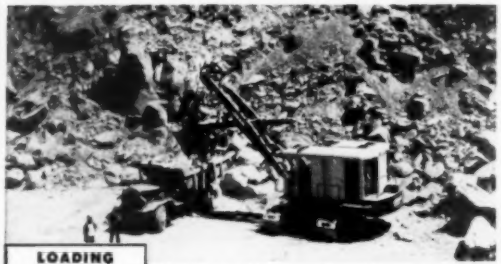
STRIPPING OVERBURDEN
L-80
DRAGLINE

With a big Lorain-80 or 820 Dragline you can toss the bucket far and wide . . . dip deep and pile high. For the tougher overburden big, heavy-duty Lorain-80 and 820 shovels are the answer.



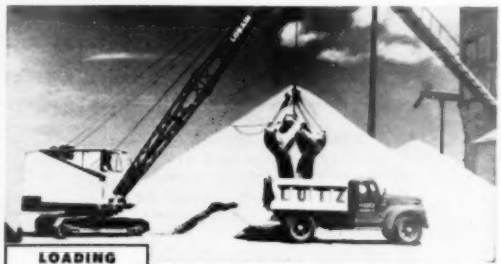
DIGGING SAND
TL-25
DRAGLINE

Working from the top—a modern, new ¾ yd. Lorain TL-25 Dragline, with its fast, snappy performance is your best answer. Lorain draglines—or shovels for use *in* the pit—are available in ½ to 2-yard classes.



LOADING ROCK
L-820
SHOVEL

Built tough for rough work in rock, the Lorain L-820 has the extra power and large 2-yd. capacity for big loading production. Shock-absorbing Hydraulic Coupling (in 1 and 2 yd. classes) takes the "shock out of rock".



LOADING TRUCKS
TL-15
CLAMSHELL

Pits and quarries with material handling problems—from sand to stone—can meet almost any output demand with Lorain clamshells, from ½ to 2-yard classes. Here a ½ yd. Lorain TL-15, on a crawler, is the answer.



CHARGING BINS
L-50
CLAMSHELL

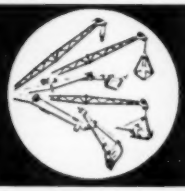
Lorains are not single purpose machines. A change to clamshell bucket and you're in business charging bins. This Hydraulic Coupling equipped Lorain-50 (in the 1-yard class) is ideal for pit or yard duty.

ANSWERS . . . TO ALL PIT AND QUARRY PROBLEMS

- **LORAIN *SHOVELS*** . . . for duty in the pit—no rock is too tough—no production demand too great. From ½ to 2-yd. classes.
- **LORAIN *DRAGLINES*** . . . for stripping deep overburden—works from the top of the pit.
- **LORAIN *CLAMSHELLS*** . . . for handling all types of materials—charging bins, loading trucks, unloading cars, etc.
- **THERE'S A LORAIN** for *every* pit and quarry problem. For the best answer—see your Thew-Lorain Distributor.

THE THEW SHOVEL CO., LORAIN, OHIO

THEW **LORAIN**®
on CRAWLER or RUBBER



SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

FROM INGOT TO FINISHED ROPE:

there are no gaps in our

Quality Control



Quality control of Wickwire Rope is *complete and uninterrupted* from the actual smelting of our own iron and steel to the final making of the finished rope.

Only a company like C. F. & I. with its constant checking, testing and inspection through every step of manufacture can give you the big advantages that are derived from a constant and uniform size of steel grain in each grade of finished rope wire. When you specify Wickwire Rope you're sure of wire rope that's unequalled for safe and unfailing performance . . . longer, more economical and uniform service on the job.

LOOK FOR THE YELLOW TRIANGLE ON THE REEL

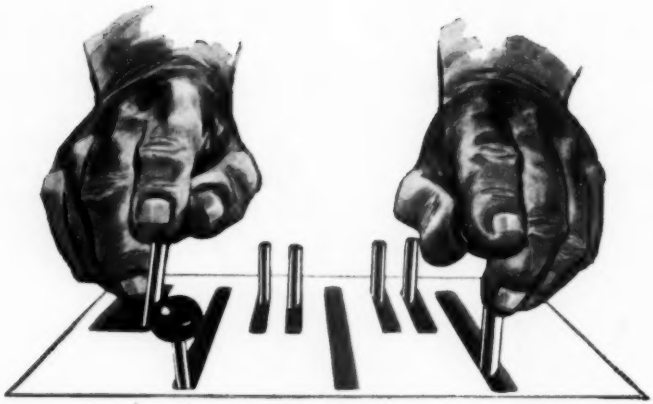
WICKWIRE ROPE CF&I

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Casper • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Houston • New York Odessa (Tex.) • Philadelphia • Phoenix • Salt Lake City • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California



At your fingertips... up to 25% increased output with

SMOOTHER, EFFORTLESS *Speed-o-Matic* CONTROLS

LINK-BELT SPEEDER

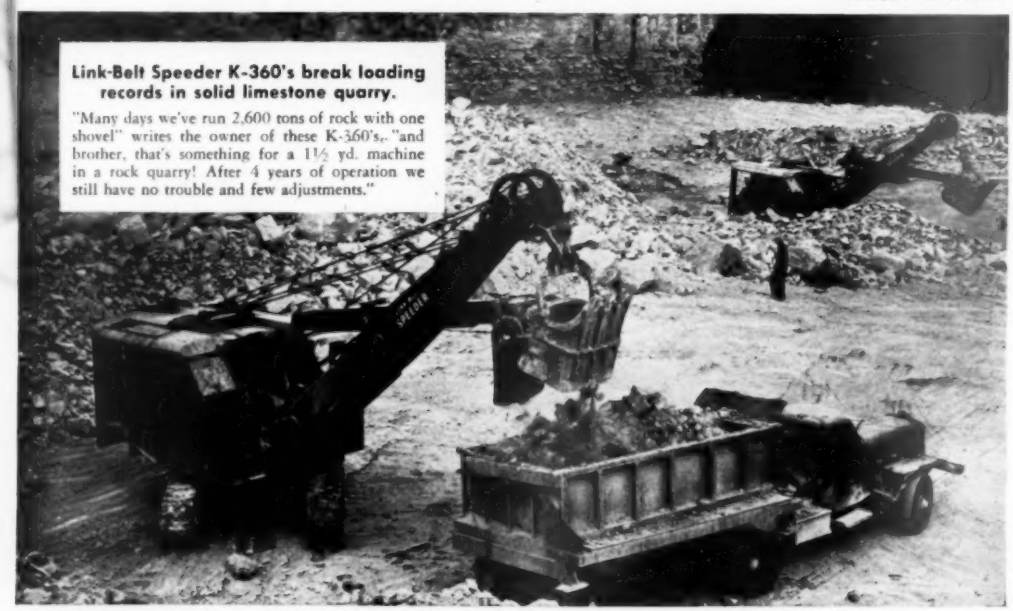
Fingers instead of muscles do the work, thanks to Link-Belt Speeder's remarkable, exclusive Speed-o-Matic* controls!

But there's more to this than ease of operation. Every move of Shovel-Crane is faster, surer—far more effortless. You get "pin-point" placement of bucket, shovel or hoe, and there's no drag or lag, jerk or jump. And for perfect control, you "feel the load" every inch of the way.

Operators praise the ease Speed-o-Matic controls provide. Say they keep far fresher, far more alert—even during long overtime. This pays off in greater output, more profitable operation for you.

When you're considering Shovel-Cranes—remember, only Link-Belt Speeders can offer you the amazing advantages of Speed-o-Matic *full* hydraulic controls. Look to Link-Belt Speeder for *more work*, more kinds of work, more of the time.

**On 51, 300 and 500 series*



Link-Belt Speeder K-360's break loading records in solid limestone quarry.

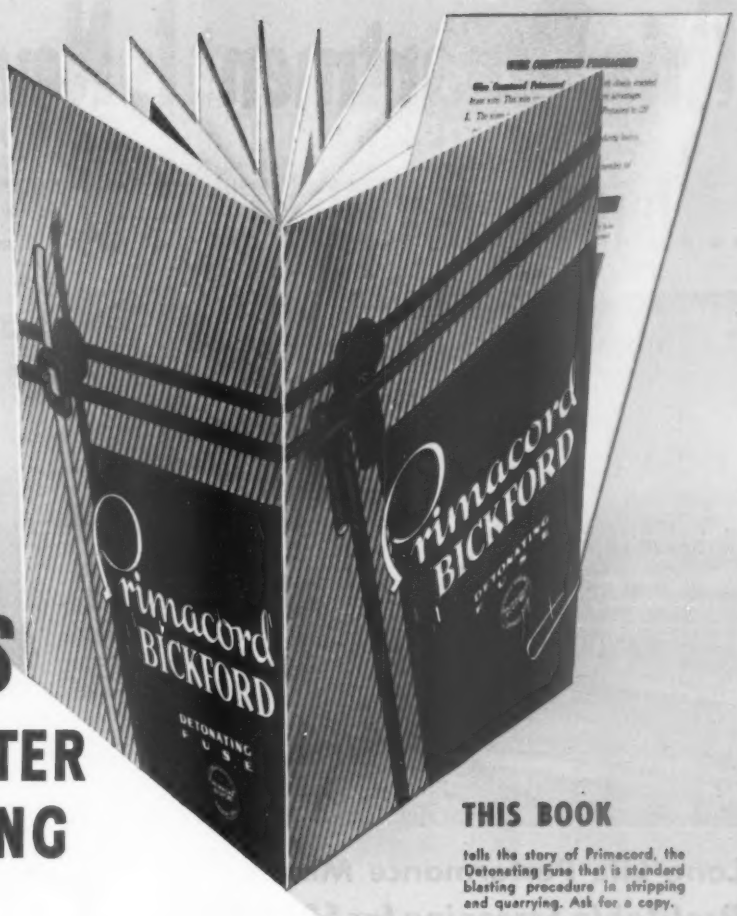
"Many days we've run 2,600 tons of rock with one shovel" writes the owner of these K-360's, "and brother, that's something for a 1½ yd. machine in a rock quarry! After 4 years of operation we still have no trouble and few adjustments."

LINK-BELT SPEEDER
CORPORATION

Builders of the most complete line of shovels, cranes and draglines
CEDAR RAPIDS, IOWA

12,480

Four Brands FOR BETTER BLASTING



THIS BOOK

tells the story of Primacord, the Detonating Fuse that is standard blasting procedure in stripping and quarrying. Ask for a copy.

As shown on the booklet from left to right: Plastic Reinforced Primacord for very deep, wet holes, river crossings, etc. . . . Plain Primacord, for surface trunk lines and shallow holes . . . Reinforced Primacord for deep holes where extra tensile strength or resistance to abrasion are desirable . . . Wire Countered Primacord for deep, ragged holes and high abrasive conditions.

Choose the brand that meets your conditions and you will also choose safety, simplicity of hook-up, ease of use, freedom from the danger of stray currents, and best results from a minimum quantity of explosives.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Also Ensign-Bickford Safety Fuse — Since 1836

P-51

PRIMACORD®-BICKFORD Detonating • Fuse •

This Department Is Never Busy

...but Seco VIBRATING SCREENS ARE!



Long Life Performance Means *Profitable Screening* for SECO Users

If you have Seco vibrating screens on your job . . . it's good to know that you can get *quick service* on any parts replacements you may ever require. That's part of Seco's service policy . . . another of the reasons why you put your confidence in the Seco organization.

BUT HERE'S SOMETHING MORE IMPORTANT!

Seco vibrating screens are *built to endure*. The smooth, balanced performance of patented Seco vibrating screens pays off in long life . . . and a holiday from excessive maintenance worries. *It's a proven fact!* Thousands of busy Seco vibrating screens can't keep our parts department busy.

SECO
TRUE CIRCULAR ACTION
VIBRATING SCREENS

WHAT'S AHEAD? Check your screening requirements now.

PLAY SAFE! REPLACE OR ENLARGE WITH
Performance-Proven
SECO VIBRATING SCREENS
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MORE than a family resemblance



Regardless of what size Oliver Industrial Wheel Tractor and Ware Loader you buy . . . "66", "77", "88" . . . you get the identical superior design and performance features in each.

The smaller tractor-loaders are not built down to a price level . . . they are built up to the same quality standards as the larger models.

In the tractors, you get the famous Oliver *plus* power and easy maneuverability that get you in and out of the rough spots . . . *fast!*

In the loaders, you get the same top features in each . . . hydraulically controlled bucket for greater "breaking out" action—full bucket loads . . . hydraulically controlled discharge—easily and gently, fast or slow . . . mid-section pivot of the loader arms for longer reach of dumping position and correct weight distribution on tractor frames . . . simple, rugged design that eliminates unneeded dead weight . . . shock loads absorbed by hydraulic rams for longer tractor and loader life—lower maintenance.

Your Oliver Industrial Distributor will be happy to show you what the "more than a family resemblance" in Oliver-Ware Tractor Loaders means to you in lower cost operation. And see the Oliver color film "Task Force on Wheels."

THE OLIVER CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of industrial wheel and crawler tractors

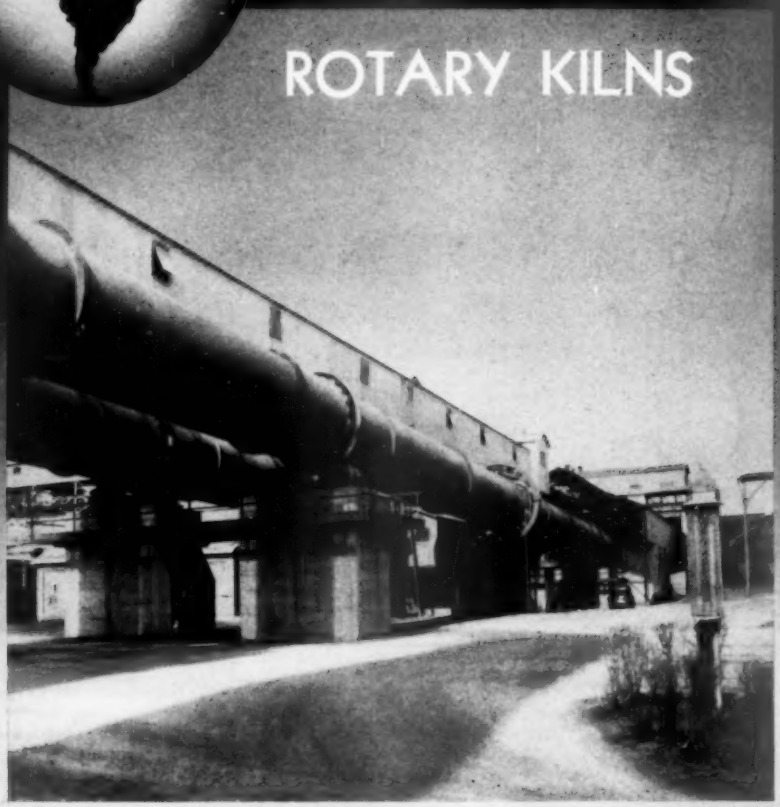






SMIDTH

ROTARY KILNS



141 Smidth Rotary Kilns have been sold from January 1946 to December 1950.

For Smidth Machinery apply to:

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11 West 42nd Street
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London, W. 1, England

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F. L. Smidth & Co. of Canada, Ltd.
11 West 42nd Street
New York 18, N. Y.

F. L. Smidth & Co. (Bombay) Ltd.
42 Queen's Road
Bombay, India

"WE HEAR..."

June, 1951

The toll road is well on its way back, according to a study made by The Brookings Institute. With 15,000,000 more vehicles on the road than before the war, the difficulties of financing main highway modernization have led more than half the states to consider toll collections as a way to meet mounting costs. The study, "Toll Roads and the Problem of Highway Modernization," also points out that several states are already operating toll facilities on important intercity routes.

* * * * * * * * *

Construction contract awards in Canada during 1950 topped the previous record established in 1949 by 33.8 percent. The 1950 awards totaled $1,525,764,700, as against $1,140,116,200 in 1949. The engineering division showed the greatest increase of any type of construction work at 62.1 percent above the previous year. Business and industrial construction were 36.1 percent and 35.8 percent higher, and residential work gained 16.7 percent.

* * * * * * * * *

The scarcity of pig iron and high-quality coke is resulting in foundrymen shifting from acid materials in the refractory linings of its cupolas to basic,or alkaline, materials, as reported recently in Business Week. Acid materials cost only about one-third as much as basic, but the basic cupola linings last longer. The acid cupola linings work fine when high-quality coke, which contains comparatively little sulfur, is used and if pig iron, rather than scrap, is used in the charge. Low-quality coke has a high sulfur content, and when scrap instead of pig iron is used, more coke is required, which means still more sulfur. Basic cupola linings get rid of sulfur in the charge. Also, it is said to result in fewer costly relining jobs.

* * * * * * * * *

Engineering construction for the first 17 weeks of 1951 totaled $4,997,800,000, a gain of 44 percent over the same period in 1950, as reported by Engineering News-Record. Private construction totaled $3,058,000,000, a gain of 52 percent, and public works amounted to $1,939,800,000, a gain of 32 percent. Federal construction is running 62 percent higher than last year, while state and municipal awards are up 18 percent.

* * * * * * * * *

A plan to set up a $564,000,000 flood control project in the upper Delaware River basin will be presented to the Pennsylvania, New York, New Jersey and Delaware state legislatures soon. By terms of the plan, a series of four dams would be built in the basin above the Delaware Water Gap.

* * * * * * * * *

The "life expectancy" of some 1951 conveyor belts has been extended, in some instances, by as much as 60 percent as a result of using new materials and better production methods, according to W. L. Smith, technical superintendent of the B. F. Goodrich industrial products division. He stated that conveyor belts designed to carry hot materials now are able to transport 40 percent greater tonnage than they did in 1940. He also estimated that the life of belts specially designed to resist oils and greases has improved 100 percent.

* * * * * * * * *

A "clean car campaign" has been inaugurated in the greater Kansas City area. Shippers and receivers of carload rail freight have been urged to "unload railroad cars clean," to help in overcoming the current shortage of freight cars.

WE HEAR

A new exothermic material containing lime has been designed to increase production of castings by reducing the waste metal in risers. The material consists of powdered aluminum, blended with a metallic oxide (usually FeO) and lime. The lime, acting as a slag, removes impurities and separates completely from the iron. In use, the powdered material is placed upon the riser of a freshly poured casting, and the mixture is ignited by the heat of the poured casting. The iron (or metal) produced in the exothermic reaction solidifies with the metal of the casting. The shrinkage produced in the cooling of the casting is thus controlled by depositing additional metal.

* * * * * * * * * *

Among some of the ridiculous claims made against cement companies and similar businesses about plant dust is one concerning a southwestern cement company whose plant dust allegedly "kills cotton, strips autos of paint, whitens trees, makes corn pullers sick, sheep noses run and housekeeping difficult."

* * * * * * * * * *

More than $25,000,000 in net operating revenues, or 8 percent of the money expended to date on the Central Valley Project of California, already has been repaid to the federal treasury through water and power sales, despite the fact that the project will not go into integrated operation until July, 1951, as reported by the Bureau of Reclamation, U. S. Department of the Interior. It was stated that the C.V.P. is rapidly being geared to the demands of the nation's current emergency and will greatly improve the critical power and water supply in the great agricultural central valley of California. Those portions of C.V.P. already completed are reported to be in highly successful operation.

* * * * * * * * * *

According to recent tests, highways used by overloaded trucks deteriorate 20 times as fast as those over which only legal loads are permitted to pass. Maj. Gen. Philip B. Fleming, Under-Secretary of Commerce for Transportation, recently told the New York Journal of Commerce that in order to preserve the nation's highway system in the best possible condition to meet emergency transportation needs, the strictest enforcement of maximum truck-loading rules will be insisted upon by federal authorities.

* * * * * * * * * *

A new law, designed to make commercial truckers pay a more equitable share of highway costs, will become effective in the state of New York, October 1, 1951. The law provides a graduated weight-distance tax on commercial trucks weighing more than 18,000 lb. gross. It is said to be the first law of its type to be enacted in any eastern state and is modeled somewhat on the highway tax law now in effect in Oregon. Passage of the bill followed publication early last year of the Griffenhagen report, which showed that passenger automobiles in New York were then paying in license and gasoline fees between four and five times as much as heavy trucks.

* * * * * * * * * *

The U. S. Public Health Authority is making a survey of the country to determine those municipalities in need of additional sewer and water supply facilities. It has been suggested that anyone knowing of a city or municipality contemplating such works should advise them to so inform their local State Health Authority so that the information could be channelled through to Washington. It is expected that all requests for materials in short supply for sewer and water projects will be screened by Public Health in Washington to determine essentiality. It was predicted that where the bond issue has been voted and where the Public Health Authority has had a chance for review, that prompt attention will be given to processing the materials in short supply.

* * * * * * * * * *

According to recent reports, the Aluminum Ore Co., after its alumina expansion program has been completed, will have an estimated requirement of 11,000 tons of lime per month. The new alumina plant of the company will use the Bayer process, which was said to account for most of the increased lime requirement.

THE EDITORS

TAKES HEAVY IMPACT

LIKE A POOL TAKES A PEBBLE



Homocord CONVEYOR BELT

"We seldom see a cut or gouge in Homocord Conveyor Belts. And they consistently outlast other belts on heavy-duty installations."

There are engineering reasons for this typical user report. The extra body-cushion built into Homocord dissipates the shock of sharp impact from large lumps of coal, ore and rock . . . assures long life. Natural troughing and flexibility add up to more ton-miles of materials carried.

Full description of these and other advantages are described in Bulletin 6906. Let us send you a copy. You get the same long-life engineering in R/M hose, V-belts and flat belting. Ask your R/M representative.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls



When They Whisper, *WATCH OUT!*



SURE, THOMAS Pump Parts Break *SO WHAT?*

"Thomas' Ni-Hard is a good abrasion material, but it can be easily broken in service. I have seen Thomas Pump parts with holes broken in them. Better play safe."

You may hear such comments from an "Eager Beaver" salesman whose pump was designed for manganese steel or cast iron and might not be suitable for Ni-Hard. If so, ask your informant how long the Thomas Pump parts he mentions had been in service when the holes developed.

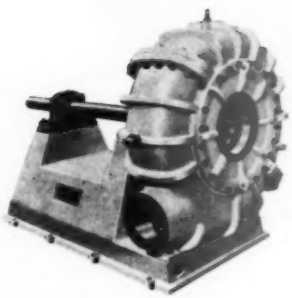
His answer — to be truthful — would have to be about like this:

"Oh, they probably outlasted manganese or cast iron, some — but——"

DESIGNED for THOMAS NI-HARD

HERE ARE THE FACTS. The 8" Thomas Pump parts shown above "with holes in them" are typical of our Ni-Hard. When removed they had been in service four to five times as long as manganese and six or eight times cast iron — all in the same service in the same plant.

Thomas DURABLE Dredge Pump was especially designed to be made of abrasion resistant Thomas Ni-Hard. This special design enables Ni-Hard to do its ultimate "stuff" in spite of shock and impact that *might* cause failure in a pump of conventional design.



THOMAS DURABLE Dredge Pumps as shown above have *increased service life* and are *producing more sand and gravel* in many installations, for three reasons:

1. **Extremely hard alloy**
2. **Double casing with water cushion between the shell and liner**
3. **Extremely close running clearances — Suction Water Seal keeps them close**

Write for illustrated circular.

THOMAS Foundries, Inc.

BIRMINGHAM, ALA.

What's Behind The Euclid Name?





* Dependability

Euclids are engineered for the job . . . built for efficient, long life performance in off-the-highway service. In mines and quarries, on construction and industrial jobs, "Eucs" have earned their reputation for durability and low cost operation.

Plenty of power . . . large capacity for bigger loads . . . body designs for all types of materials . . . earth, ore, rock, or coal. Rear-Dump Euclids range in capacity from 10 to 34 tons, have diesel engines from 125 to 400 h.p. Bottom-Dump Euclids have capacities of 13 to 50 cu. yds., 20 to 40 tons with diesel engines to 300 h.p.

Repeat orders prove customer satisfaction. Owners say that "Eucs" actually cost less to own than any other hauling equipment. Euclid dependability will pay off on your present or future jobs. Write for complete information on the Euclid line, or call your distributor today.

The EUCLID ROAD MACHINERY CO.,
CLEVELAND 17, OHIO

MORE LOADS PER HOUR—
MORE PROFIT PER LOAD

EUCLID

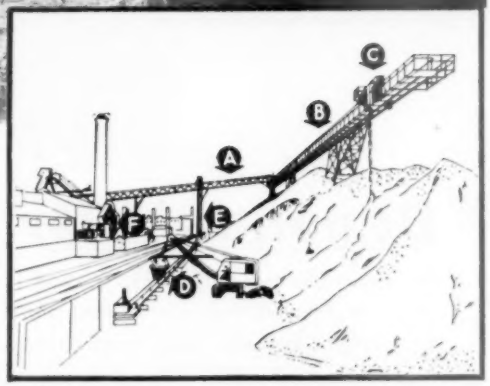


Another Example of Continental's Belt Conveyors at Work -

The Southern Cement Company's conveying and elevating system in their Birmingham Plant incorporates several advanced features of design—one of which is illustrated above and to the right.

Continental's engineers are skilled in "practical engineering" — the kind that results in installations designed for economical, dependable operation and long life. All Continental products — whether especially designed systems and equipment or standard equipment and accessories — show the value of practical engineering.

• *Call Continental engineers in on your job — or specify Continental on your next replacement order.*



Slag is carried to storage by Conveyors A and B and discharged to storage at any point by self-propelled Tripper, C. As material is needed for processing, it is loaded by shovel onto Reclaim Conveyor D, raised by Bucket Elevator E, and discharged onto return side of Conveyor Belt A., which delivers it to Plant F.

CG-4905

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA
ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

Thermoid
Industrial Rubber Products
Quality Value Service



Power—at Lowest Cost Per Hour with Thermoid Multi-V Belts

Thermoid Multi-V Belts are pre-stretched to insure maximum power transmission without adjustment. They are constructed for flexibility and ability to absorb repeated shock loads . . . thoroughly impregnated with special rubber compounds to withstand moisture and abrasion, resulting in longer belt life.

Thermoid Multi-V Belts are available in matched sets—uniform in size and cross section. Their longer life and non-slip performance add up to "Power—at the lowest cost per hour."

Your Thermoid Distributor can help you with your power belting problems—whether you need Multi-V, F.H.P. or flat transmission belts. For unusual belt problems, a Thermoid Field Representative is always available to give you the benefit of his experience.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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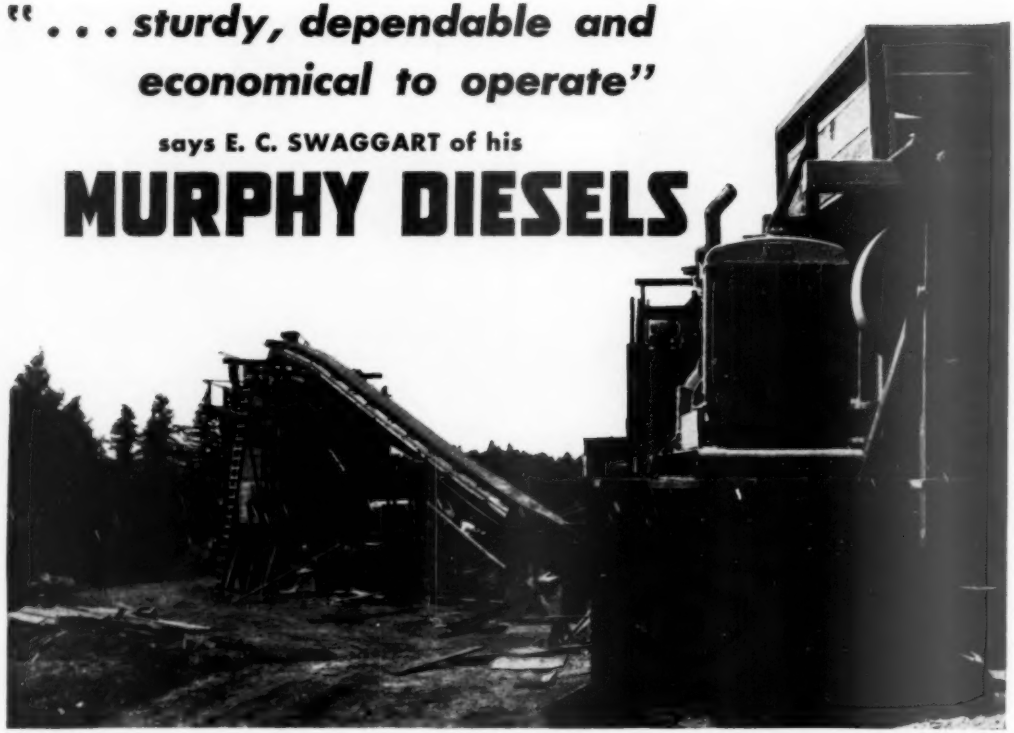
Rubber Sheet Packings • Molded Products
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"... sturdy, dependable and economical to operate"

says E. C. SWAGGART of his

MURPHY DIESELS



● ONLY the user can be the final judge of the merit of a diesel engine ... and that's why we're so proud of what Murphy Diesel owners tell us about their engines. The remarks of E. C. Swaggart, a general contractor of Eugene, Oregon, are typical. He recently wrote as follows:

"I have six Murphy Diesel Power Units powering my crushing plants and one Murphy Diesel Generator Set. I have been using Murphys for five years and have always found them sturdy, dependable and economical to operate. For these reasons, and because of Murphy's fast action, if I need another power unit for my rock plants, I would buy a Murphy."

This kind of user loyalty can be built only by a product that delivers the goods.

Murphy Diesel's ability to deliver more power, greater fuel economy, greater dependability and longer life are the result of an exclusive combination of advanced design features. These include "true" diesel operation ... unit fuel injection ... four valves per cylinder ... hydraulic servo-type governor ... and many others. Full details are given in the booklet *"10 Questions to Ask a Diesel Engine Salesman"*. Ask your Murphy Diesel Dealer for a copy or write direct.

MURPHY DIESEL COMPANY

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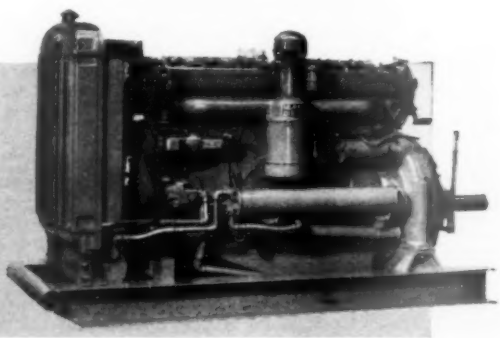
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Murphy Diesel engines and power units are made in sizes from 90 to 226 H. P.; generator sets from 60 to 140 K. W.



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the TRAYLOR TY Gyratory

is an outstanding Crusher

UPPER SHELL and Three Arm Spider of the Traylor TY is formed in a single steel casting. Note, too, the bell head and curved concaves of manganese steel and the sturdy main shaft.



LOOK AT THIS BOTTOM SHELL. See the all-around bottom discharge, without diaphragm, and the oil-tight, dust-tight chamber housing the water-cooled forced-flow lubrication system.

The design features described above, enable the Traylor TY to maintain its lead in the field of secondary fine crushers. With the increased capacity of each succeeding zone in the crushing chamber the TY has a remarkably low power-per-ton factor. These features as well as many others are fully described in the Traylor TY Reduction Crusher bulletin. Return the coupon for your free copy today.



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I want to see how a Traylor TY will cut my reduction costs.

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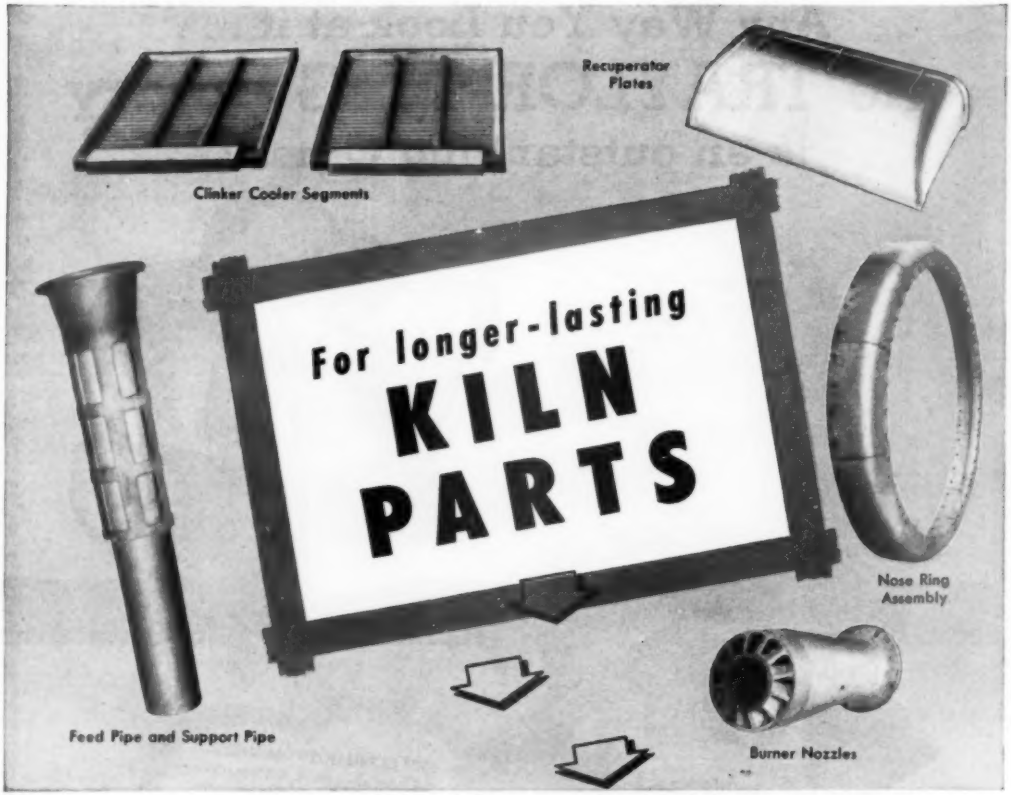
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Thermalloy is not just one alloy. It is a *group* of alloys, each developed to meet a specific heat and abrasion problem.

An Electro-Alloys engineer can show you how Thermalloy kiln parts can give you *lower operating costs per hour* . . . assist you in selecting the design best suited to your needs. Call your nearest Electro-Alloys office, or write Electro-Alloys Division, 2143 Taylor Street, Elyria, Ohio.

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AMERICAN Brake Shoe COMPANY

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12,500,000 TONS HANDLED...



was just a start for Rex Idlers

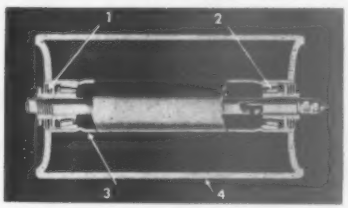
You'd think that carrying 12,500,000 tons of material would be a lifetime job for any belt conveyor idlers. After these rugged Rex Idlers handled that amount of aggregate for the Shasta Dam as a starter, the same idlers were installed on the longest, highest belt slope conveyor in regular service. And they're still going strong.

That's real proof that Rex Belt Conveyor Idlers give you lowest cost service . . . that they eliminate costly down time caused by premature idler failures. Not only do Rex Idlers last longer, they also are easy on the belt. They eliminate destructive belt pinching and creasing, and absorb practically no power. Special application idlers, such as Rex Impact Cushioning Idlers illustrated above (lower right hand corner), installed under loading points, protect belt from laceration and carcass failures.

For the complete story on these cost-cutting idlers, mail the coupon for your copy of Bulletin No. 463R.

REX BELT CONVEYOR IDLERS

These Rex Quality Features Add Life to Your Conveyors



1. Triple labyrinth grease seal . . . dust stays out, grease stays in.
2. Tapered roller bearings, deadshaft type mounting, oversize capacity.
3. Unit mounting for bearings for positive alignment and minimum friction.
4. Heavy duty one-piece welded steel construction for maximum roll life.

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Gentlemen:
☐ Send me my copy of Bulletin No. 463R.
☐ I would like to see a Rex Field Sales Engineer.

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Company.....*Dept*.....

Address.....

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★ ★ ★ Editor's Page

At Last! A Favorable Action on Percentage Depletion

THE GREAT DEBATE between the federal administration and General MacArthur on international policies has dominated public attention almost to the exclusion of all else, on the surface, but there is very hopeful evidence coming out of Washington that important domestic issues nevertheless are being considered on their merits.

Lack of confidence in the administration has set the stage for a showdown, not only in military and diplomatic matters, but the administration is being critically challenged in its policies with relation to the civilian economy. Congress, while wrapped up in the MacArthur controversy, is not being blinded by the national emergency and all the hysteria that goes with it and, instead, is beginning to take sensible action to protect industry and the national economy.

After all, the goal of war is to protect our democratic system, which means that industries must be encouraged to promote prosperity through the profit system. The attitude of the administration to tax most everything indiscriminately, in order to raise funds to cover its expenses, has had depressive effects on business and the individual. Until criticism of the administration reached its peak with the current debate in Washington, it appeared that there was little hope for any concessions to industry, however logical they be.

Depletion Allowances

It is noteworthy that the House Ways and Means Committee, early in May, rejected administration proposals to reduce depletion allowances for oil and gas, nonmetallic minerals and sulfur and, instead, voted to boost the depletion allowance for coal and to grant percentage depletion to a long list of minerals. This action may or may not be incorporated into the proposed 1951 tax bill as it is finally written.

It is a tribute to the efforts of aggressive industry trade associations and other organizations that they kept up the fight for depletion allowances in the face of an atmosphere that, a few months ago, generated anything but hope for any relief that would cut into government revenues.

While all the turmoil and confusion has been going on in Washington, because of the national emergency, there has been a process of education underway whereby Congressmen have been prevailed upon to become familiar with the workings of industries with wasting assets. There has been convincing testimony assembled, supported by facts and data, that could not forever be denied by Congressmen who have become conditioned by recent events to pay more attention to their constituents.

This decision of the House Ways and Means Committee still leaves much to be desired in the amounts of relief granted certain of the rock products industries but further effort of educational character should eventually turn the trick.

Need for Depletion Allowances

The full fifteen percent allowance sought for certain nonmetallic minerals was granted. Among them are fuller's earth, perlite, metallurgical and chemical grade limestone, tripoli, quartzite, refractory and fire clay and diatomaceous earth. Reserves of all these minerals are not unlimited and producers unquestionably merited concessions in order to permit expensive exploration and acquisition of reserves for the future.

It has been said recently that the known reserves of high calcium limestone of purest chemical grade, as required by important chemical industries, is only sufficient for fifty years. Obviously, these reserves must be increased, for the chemical industry has just started its growth.

Sand, gravel, "stone," marble, granite, shale, shell and brick and tile clay were granted a five percent depletion allowance. None of these minerals appears, on the surface, likely to be as short in available supply as those awarded fifteen percent allowance.

Their occurrence is more common but there are considerations that constitute a strong argument for future increased allowances. In sand and gravel, taken as an example, it makes little difference that they are available in all of our states. It is of important concern to our economy that the exhaustion of *economically available* sand and gravel is rapidly approaching a state of crisis. The developing zoning restrictions and the established trend to rigidity of specifications that render former accepted sources useless must also be considered.

It has been estimated that the new and increased depletion allowances will cost the treasury about seventy-five million dollars a year, but it has been proved by action of the committee that the rational plugging of certain tax loopholes can more than make up the difference. Such reasoning can be applied in increasing the allowances for the aggregates industries.

Bror Nordberg

Paul Wilson, Ira, Ohio has *TWO EAGLES* on his team!



1 AN EAGLE WATER SCALPING TANK.

2 AN EAGLE WASHER-CLASSIFIER-DEHYDRATOR.

Many large plants use Eagle equipment, but here is a smaller plant that is definitely profiting from an Eagle Water Scalping tank and an Eagle Single Screw Washer-Classifier-Dehydrator. Pit run material passes through a grizzly and is belt conveyed to a wet screen. Gravel is chuted from screen to stockpile. Sand passing the screen drops to the water scalping tank where excess water is removed. Concentrated material flows through a bleeder gate in the bottom to the Eagle Screw unit. Here material is scoured clean, excess fines flowed off and the dehydrated sand deposited onto a stockpile.

Whatever the size of your operation you are assured greater profits from premium material—material that meets specifications and maintains steady markets.

Send for the facts in Catalog 47.



MEET THE "*Pixie*"

Eagle's new "vestpocket" Fine Material Screw unit. Has a 12" dia. screw and a capacity of 10- to 15-tons per hour. A light, compact unit that will fit into many small operations, or on-the-job portable aggregate plants. U-shaped weir provides for retention of fines.

Serving You Since 1872

EAGLE IRON WORKS

Log Washers, Screw Washers - Classifiers - Dehydrators, "Swintek" Dredging Ladders, Water Scalping Tanks, Cinder Crushers and Grinders for Concrete Products Plants, Shale Planers, Pile Drivers, Breaker Bells.

137 Holcomb Ave.
Des Moines, Iowa.

Rocky's NOTES

Nathan C. Rockwood

How Necessary Legislation Is Stymied

OUR GOOD FRIEND Lester T. Sunderland, of Kansas City, presented our editor, Bror Nordberg, with a suitably inscribed copy of "Geographic Pricing Policies,"* by William Simon, Chicago, Ill., attorney. To help Bror out we consented to look it over, expecting, frankly, to find it rather boresome, since legal minds and engineering minds seldom have much in common. Contrary to expectations this book proved quite interesting reading. It is concerned chiefly with a general discussion of what is popularly called "basing point selling," and with the current history of proposed legislation, now before the Congress of the United States designed to clear up the confusion created by the mystifying decision of the U. S. Supreme Court in the Cement Institute case in 1948.

The first part of the book is a discussion of the various methods of pricing a commodity, which is instructive reading for the producer or distributor of any kind of rock product. This includes the origin of delivered pricing practices, where it is stated: "The ingenuity, incentive for profit, and industrial genius that made America great, caused many businessmen to take advantage of the available transportation, communication and financial facilities to obtain a greater number of customers for the goods they produced. This is the genesis of mass production, and its resulting economies in production costs."

This book is no apology for the misuse of this or any other pricing method. For it is made plain that any pricing system yet devised by man may become the basis for a conspiracy. With regard to the single basing-point price system, originally for steel at Pittsburgh and for portland cement, the Lehigh Valley, out of which grew the multiple basing point system, quoting from the text: "Although undoubtedly the prices of many commodities have been, and may now be, based upon the price at a single 'basing point' in the total absence of conspiracy, the phrase 'basing point system' is sometimes regarded as referring to the use of that practice by conspiracy."

That idea has so taken root among those who regulate and write about our economic system, that the end result has been numerous attempts to abolish the basing-point price altogether and to substitute a uniform f.o.b. mill price system. It seems this idea originated not with either producers or buyers, but with a college professor of economics, and it has been promulgated and sustained through the years by other professors and men of equal lack of practical knowledge or experience in the actual workings of our economic system. Moreover, the struggle still goes on.

Absorption of Freight Rate

The author gives a clear, non-technical exposition of the reason why the practice of absorbing freight rates grew up in order to meet competitors' prices in distant markets, reducing costs by increasing volume, and how in a country as large as ours and as well serviced by transportation systems, industry, on the present scale could hardly survive on an economic keel in any other way. In any kind of an f.o.b. mill pricing system it is the buyer who is penalized by not being allowed to use competition to get his purchase costs down. Instead he is compelled to pay the nearest local producer's asking price, which is fixed not by his cost of production but by the amount of freight rates his competitors would have to absorb to reach his market. That price has often been, in the cement industry, we know, higher than a more distant competitor would have been glad to sell for in the same market in order to reduce his overall cost.

The numerous fallacies of the rigid f.o.b. mill price are too well-known by experience in these industries to require any elaboration, but the reader of this book will find all these facts and arguments marshalled in clear and unequivocal language, that will be immensely helpful to him when the time comes again to take up the subject with his congressman, or if he becomes involved in a legal tangle.

The confusion that exists over the meaning of some of the various laws designed to preserve a competitive economy appear to be as great among the members and staff of the Federal Trade Commission as it is among businessmen who are attempting to operate and comply with the laws. The following paragraph, we think, is of much significance to an understanding of the whole picture:

"The avowed purpose of our anti-trust laws is to preserve a competitive economy. They are designed to maintain the free enterprise, capitalistic, competitive system. Compliance with the competitive commands of the anti-trust laws therefore includes a knowledge of the meaning of 'competition' as well as an understanding of the distinction between injury to *competition* and injury to *competitors*. In this distinction lies a substantial understanding of the issues as to the propriety of freight absorption, delivered prices and good faith competition." The chapter containing this paragraph is a very interesting discussion of the philosophy back of the Sherman Act and its amendments and of the Robinson-Patman Act.

Congressional Inaction

Immediately following the Supreme Court decision in the Cement Institute case, in May, 1948, bills were introduced in the 80th Congress to clarify the meaning of these laws. About half of this 360-page book is devoted to tracing the course of this proposed legislation through committee hearings and debates of 80th and the following 81st Congresses. It furnishes an enlightening example of how business is conducted in our national legislature.

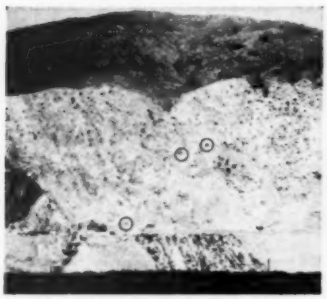
The record states: "Congressional supporters of S.1008 included most respected and experienced members of the Congress. In addition to Senator O'Mahoney (who had introduced the bill), Senator Capehart (who originated the inquiry) and Senator O'Connor (floor manager of the bill), the Senate supporters included Senators Francis J. Meyers, Democratic whip, Kenneth S. Wherry, Republican floor leader (majority leader in the 80th Congress), Ed. C. Johnson, Chairman of the Committee of Interstate and Foreign Commerce, and Pat McCarran, Chairman of the Committee on Judiciary. In the House the principal supporters were Congressmen Francis E. Walter, Chairman of the Democratic Caucus, Charles A. Halleck (R., Ind.), Majority Leader in the 80th Congress, and Earl C. Michener (R., Mich.) ranking Republican on the Committee on the Judiciary and its Chairman in the 80th Congress. Senate leaders of the opposition were Senators Russell B. Long, Estes Kefauver, Paul H. Douglas and Hubert H. Humphrey—for each of whom the 80th Congress was his first session in the Senate. House leaders of the opposition were congressmen Wright Patman, Chairman of the Select Committee on Small Business, John A. Carroll, Hale Boggs (D., La.) and Edwin S. Willis (D., La.). At the public hearings so businessman, big or little, opposed the bill.

*Published by Callaghan & Co., Chicago, Ill., 1950.

DU PONT "NITRAMON"* COYOTE TUNNEL BLAST

PRODUCES HALF MILLION TONS OF ROCK

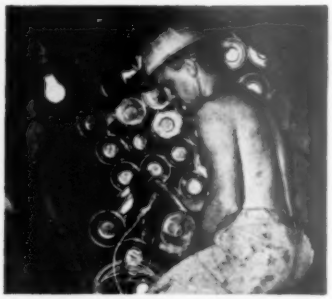
. . . with maximum safety, convenience and economy



Quarry at Corona, California, owned by the Minnesota Mining and Manufacturing Company has face approximately 325 feet high. A double set of coyote tunnels was used; (note the circles); one at floor level and the other roughly 200 feet above the quarry floor.



Workmen hauling Du Pont "Nitramon" into the lower tunnel. For coyote tunnels, "Nitramon" is an ideal blasting agent because, in addition to its superior safety features and efficiency, it eliminates all risk of headaches both in loading and handling.



Quarryman stacks "Nitramon" and "Nitramon" Primer in place. When used with "Primacord," the charge represents the safest known blasting combination. With "Nitramon," ordinary electric lighting systems can be used . . . greatly facilitating speed and safety of loading.



Placing of stemming in the tunnels is also accomplished with safety and comfort, due to the use of adequate lighting and the absence of nitroglycerine odor. For maximum safety no electric blasting caps are allowed in the tunnels—all units are detonated by "Primacord."



Photo shows detonation of the shot which consisted of 156,000 pounds of Du Pont "Nitramon." Quarrymen now consider "Nitramon" the best blasting agent for this type work because of its outstanding safety and excellent spreading action which gives good fragmentation.



This "Nitramon" shot produced one-half million tons of dacite porphyry, used in the preparation of roofing materials. Because of its economy, superior performance and safety, Du Pont "Nitramon" is preferred and used by many leading quarry owners.

The Du Pont Explosives representative in your area will be glad to give you complete information on the use of "Nitramon." Call on him before your next blasting job. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

**"Nitramon" is Du Pont's registered trade-mark for nitrocarbonitrate blasting agent.*

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

LABOR RELATIONS TRENDS

Tax Aspects of Pension Plans

By NATHAN C. ROCKWOOD

WE REVIEWED a few rock product company pension plans in the January issue and discussed some of the questions that might arise in specific instances where an employer hesitated to commit himself to any plan indefinitely. Everyone hopes we never will have another depression like that of the 1930's, for everyone who experienced it knows that under similar conditions many pension plans would go out the window. In order to be able to deduct company donations to pension trusts from taxable corporation income, the company has to convince the Internal Revenue Bureau that the plan is "permanent" within reasonable interpretation of the word.

It is recognized that either the trust fund or the company may go bankrupt, but the plan must be entered into in good faith as a permanent institution and not as an experiment or an expedient to get out of a labor crisis. The problem is further complicated in such industries as our rock products operations because they, like other mining enterprises, are constantly exhausting the natural resources upon which they depend for continued operation. This, of course, is a serious problem to a small operator with only one or a few plants. It is hardly to be conceived that such a company will survive to perpetuity.

Revenue Bureau Answers Questions

These and other considerations have caused employers to ask some pointed questions of the Bureau of Internal Revenue, which resulted in the publication of a bulletin (PS67) containing six most asked questions, and answers intended as guides for similar problems. The text of this bulletin is as follows:

"Advice is requested as to the application of the limitations under section 23(p)(1)(A) of the Internal Revenue Code to deductions for contributions under pension or annuity plans established pursuant to union negotiated contracts, which contracts terminate upon expiration of a stated period of time. Advice is also requested as to the effect on such limitations of the use of the so-called 'terminal funding' method, whereby employer contributions under the plan are based upon the costs of benefits for employes, who are actually retired under the plan.

"The limitations under Section 23-(p)(1)(A) generally are not affected by the use of the terminal funding method. In all cases, including those using the terminal funding method, such limitations are, however, dependent upon the nondeferred compensation of employes covered under the plan or costs with respect to employes covered under the plan or both. There must first be a determination of which employes are considered covered by the plan. In making this determination the following principles will generally be applicable:

"(1) The plan may be assumed to be a permanent and continuing program, and all employes who could eventually qualify for benefits in the event of the plan's continuance may be considered covered by the plan (unless the provisions of the plan or union agreement or other collateral document define a narrower group of employes as 'covered' or 'eligible') if all the following conditions exist:

"(a) There is no provision in the union agreement or in any separate document describing the plan or in any collateral document, which requires discontinuance, or shows intent to discontinue, the plan or employer contributions to it at any stated or definitely determinable time. The general right to discontinue the plan or the contributions thereto at any (indefinite) time in the future may be reserved just as in any other type of plan and will not of itself prevent the plan from being considered a permanent program.

"(b) There is either (1) a separate document or booklet describing the plan in such form as to indicate a permanent and continuing program, or (2) a Board of Directors' resolution or other action by those empowered to establish the plan, made known to employes generally, setting forth the intention of the employer to establish and continue the plan on a permanent basis. Such resolution or other action may be made subject to a general reservation of right to discontinue as described in (a) above.

"(c) There is an explicit provision for liquidation in the event of termination of the plan, so that available funds will be applied to contingent as well as actual liabilities under the plan. Available funds may first be applied to the liabilities with respect to retired employes and those eligible to retire at the time of termination, provided this does not result in discrimination prohibited by Section 165(a), but any remaining funds must be used in a non-discriminatory manner for the benefits accrued under the plan for other employes who are considered covered thereunder.

Discontinuance or Changes

"(2) Where a plan is considered to be a permanent and continuing program in accordance with the above, a subsequent termination or curtailment of it will make its qualification under section 165(a) subject to review in accordance with the principles set forth in Mim. 6136, 1947-1 C.B. 58.

"(3) Where the union agreement or separate document describing the plan or other collateral document provides for the termination of the plan or employer contributions thereto at the end of a specified period, or where the funds remaining after providing pensions of employes who are eligible to retire at the time of termination may revert to the employer or be used for purposes other than benefits accrued under the plan for the employes covered thereunder, the plan will be considered to cover only the employes who can become eligible to retire under its terms during the period for which its continuance is specifically provided. This will apply to determinations under Section 165(a) as well as under Section 23(p), but does not necessarily mean that the plan will fail to qualify under Section 165(a), if the limited duration will not result in the discrimination prohibited therein.

"(4) A plan which provides that it may be terminated at any time and that any funds remaining after the provisions for all liabilities for pensioners and for those who satisfy the requirements for retirement at the time of termination may revert to the employer or be used for other purposes will be considered to cover in any taxable year only the employes who could retire under the terms of the plan by the end of the taxable year, unless terminated sooner in which case only those who became eligible for retirement prior to termination will be considered covered.

Examples

"The application of the aforesaid principles may be illustrated by the following examples:

"*Case 1* involves an employer who is committed under a union negotiated contract, which is to terminate at the end of five years, to establish a pension plan and provide fixed benefits, commencing upon retirement at age 65 or thereafter, for all employes who are union members and have at least 15 years of service. The contract does not limit the duration of the plan and the document setting forth the plan recites that it is established as a continuing and permanent program.

"The plan has been found to meet the requirements of section 165(a). The annual compensation of all union members under the plan is $1,000,000, and of those who may retire within the term of the contract $100,000. The annual contribution is $40,000. The $40,000 does not exceed the limit under section 23(p)(1)(A)(i) as applied to compensation of $1,000,000 and is deductible in full.

"*Case 2* is similar to case 1 above except that provision is made for ter-

(Continued on page 140)

Cut Cooling Costs

these 3 Ways

1. CUTS ROTARY KILN FUEL COSTS

Air-Quenching grate cooler actually returns 75% of sensible heat in clinker back to kiln as secondary combustion air. Clinker is cooled quickly, to a temperature where handling is no problem, by means of cooling air coming up through the relatively thin bed of hot material on grate.

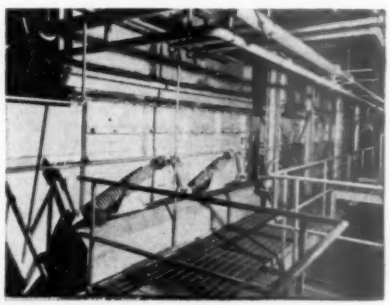
2. CUTS CLINKER GRINDING COSTS

Air-quenched clinker is easier to grind — capacities of clinker grinding mills handling hard-to-grind clinker have been increased as much as 10% with the installation of an air-quenching grate cooler. Rapid cooling also helps nullify the detrimental effects of magnesia in clinker.

3. CUTS MAINTENANCE COSTS

Reciprocating motion of grate is carried on flexible rubber bushings and springs. No wearing parts and no slippage. Clinker does not slide on grate, it hops, gently and steadily. Lubrication is negligible, only four grease fittings on entire cooler. Maintenance cost runs as low as 1/10 cent per barrel.

COOLS 100 BARRELS AN HOUR FROM 2500° TO 90° F.
In the modern plant of Dewey Portland Cement Co., Davenport, Iowa, this 4½ x 70 ft Allis-Chalmers air-quenching grate cooler cools 100 barrels of cement clinker per hour from 2500° F. to approximately 90° F. It's one of three Allis-Chalmers grate coolers installed here.



Save on Installation Cost, Too!

The air-quenching grate cooler comes as a complete unit, fits into existing plants readily because it operates horizontally. Installation costs are 10 to 30 percent less than the cost of installing any other type of cooler! Get more facts from the Allis-Chalmers representative in your area, or write for Rotary Kiln Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wisconsin.

Pulverator is an Allis-Chalmers trademark.

ALLIS-CHALMERS

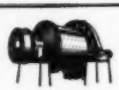
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Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.


Pulverators


Vibrating Screens


Jaw Crushers


Grinding Mills


Gyratory Crushers


Kilns, Coolers, Dryers

the *Personal Side* of the news

Public Relations Manager

JOSEPH N. BELL has been appointed manager of the Public Relations Bureau of the Portland Cement Association, Chicago, Ill. Mr. Bell joined the staff in 1948 as a writer in the Public Relations Bureau, and has been acting manager since July, 1950. He received his education at the University of Missouri, where he was awarded the degree of Bachelor of Journalism in 1946. Before joining the P.C.A., Mr. Bell served as advertising manager of the Indiana Service Corp., Fort Wayne, Ind.

Bessemer Appointments

HARRY E. REED, general superintendent in charge of operations of The Bessemer Limestone and Cement Co., Youngstown, Ohio, has been named vice-president in charge of operations. Mr. Reed started with the company in 1920 and has lived in or near Bessemer all his life. In 1935 he was made superintendent of the plant and one year later was named assistant general superintendent. He has been general superintendent since 1940. G. G. Treat, who recently celebrated his 50th anniversary with the company, has been re-elected president. Other officers named are F. B. Warren, vice-president and general manager; R. E. Roscoe, vice-president; J. Q. Adams, vice-president and treasurer; and H. G. Hinson, secretary and assistant treasurer.

Association President

GEORGE F. JACOBY, owner of the Helena Sand and Gravel Co., Helena, Mont., was elected president of the Montana Ready Mixed Concrete Association at its recent convention. He succeeds Floyd Pappin, president of Floyd Pappin & Son, Great Falls, Mont. Other officers named are Adolph Bromgard, Billings, vice-president; Gene Fehlig, Helena, secretary-treasurer; directors, Oscar Petterson of Butte, C. B. Nicely of Anaconda, Adolph Bromgard, Gene Fehlig, and Floyd Pappin.

Committee Chairman

HERBERT K. COOK, chief of the Concrete Research Division of the Waterways Experiment Station, Jackson, Miss., has been appointed chairman of a newly established subcommittee on methods of testing concrete for freezing and thawing. The subcommittee will be a part of Committee C-9 on Concrete and Concrete Aggregates of the American Society for Testing Materials. Mr. Cook has been a member of the A.S.T.M. since 1944 and was selected to head this new group because of his long association with the pioneer work of the Corps of Engineers in this field. In 1942 Mr. Cook designed the first fully automatic laboratory apparatus for testing concrete for resistance to freezing and thawing and has supervised the development and use of similar apparatus since that time.

Officers Re-elected

RUSSELL M. L. CARSON has been re-elected president of the Jointa Lime Co., Glens Falls, N. Y., which this year is observing the 100th anniversary of its founding. Frank J. Crowe has been re-elected vice-president and general manager; F. B. Chapman, treasurer; and Miss Dorothy Day, secretary and assistant treasurer.

Married in California

HERBERT F. GEIST, president of The Geist Coal and Supply Co., Cleveland, Ohio, and Mrs. Frances Oliver, widow of Alfred S. Oliver, M.D., were married in Napa, Calif., on March 7. The marriage took place in the mountain top home of Mr. and Mrs. A. G. Streblow. Mr. Streblow, who is president of Basalt Rock Co., Inc., gave away the bride and doubled as best man.

On Board of Directors

LOUIS P. STRUBLE, JR., has been elected a member of the board of directors of Dravo Corp., Pittsburgh, Penn. Mr. Struble is general manager of the Keystone Division and has been with the corporation since 1935. He was graduated in 1935 from Lehigh University with a B.S. degree in mechanical engineering.



Louis P. Struble, Jr.

Branch Manager

C. P. LINGLE, formerly sales representative in the Seattle, Wash., area of The Celotex Corp., Chicago, Ill., has been appointed manager of the Denver sales branch. He succeeds E. P. Larson who has been transferred. Portions of Washington, Oregon, Idaho and Montana heretofore served by the Los Angeles branch have been transferred to the Denver branch. Paul G. R. Armstrong, formerly a sales representative in the Minneapolis branch, has been appointed assistant manager of the Cleveland branch.

Special Representative

EVERETT E. KNOTT, formerly with the Lone Star Cement Corp. and the Halliburton Portland Cement Co., has been appointed special representative of the Dallas, Texas, division of Texcrete Co., Fort Worth, Texas, according to an announcement by George A. Meihaus, president of the company.

Executive Vice-President

CHESTER S. CRAWFORD, formerly vice-president of Lehigh Portland Cement Co., Allentown, Penn., has been appointed executive vice-president of The Whitehall Cement Manufacturing Co., Philadelphia, Penn., to succeed the late Palmer D. Gaskill. Mr. Crawford joined Lehigh after his graduation from Penn State College in 1926. He served in various capacities in the sales organization, and at one time was in charge of the New York office. He has been vice-president since 1947.

Elected Vice-President

FLOYD H. MILLEN, executive vice-president of the Valley Limestone and Gravel Co., Inc., Farmington, Iowa, has been elected vice-president of the Iowa Limestone Association. He has served two years as a member of the board of directors. Melvin E. Raid, Raid Bros., Denmark, Iowa, has been named to a three-year term on the board of directors, and C. M. Kirtley, Des Moines, has been elected president for 1951.

Division Sales Manager

DON HALL has been appointed division sales manager for the sales of Strata-Crete and Strata-Seal, two products recently made available to the oil industry by the Great Lakes Carbon Corp., Building Products Division, Los Angeles, Calif. His territory covers California, San Juan Basin, Nevada and Utah. He will maintain headquarters at the main offices of the Strata-Crete division in Long Beach, Calif.

Receives Award

CARL A. MENZEL, manager of the Housing and Cement Products Bureau of the Portland Cement Association, Chicago, Ill., has been awarded the 1951 Award of the Concrete Reinforcing Steel Institute in recognition of his research and development work on the A305 reinforcing bar. The award was made by Henry C. Turner, Jr., president of the Turner Construction Co. The American Concrete Institute has recently revised its "Building Code Requirements" to take advantage of the new A305 bar. Mr. Menzel is well known to the engineering profession for his extensive research and development work in many phases of concrete construction. In 1932, he received the Dudley Medal of the American Society for Testing Materials for his investigation of the fire resistance and stability of concrete masonry walls. In 1948, the American Concrete Institute, of which Mr. Menzel has been a member since 1935, awarded him the Wason Medal for his paper on ". . . Apparatus and Methods for the Determination of the Air Content of Fresh Concrete." He is also the author of many other papers on concrete and concrete products, and is the designer of an autoclave comparator and molds now universally used by testing laboratories and the concrete industry for measuring the soundness of cement.

A graduate of the University of Illinois, Mr. Menzel received his Bachelor's degree in mechanical engineering in 1917. Since 1918, he has been engaged almost continuously in research, testing, and development work on building materials and construction. Before joining the Portland Cement Association in 1928, he was associated with the Forest Products Laboratory, Madison, Wis., and with Underwriters' Laboratories, Chicago.

The Award Committee of the Concrete Reinforcing Steel Institute is composed of Henry C. Turner, Jr., committee chairman, president of the Turner Construction Co., representing the Associated General Contractors of America; Charles S. Whitney, Ammann and Whitney, consulting engineers, New York, representing the American Concrete Institute; and H. J. Gilkey, head of the Department of Theoretical and Applied Mechanics, Iowa State College, Ames, Iowa, representing the American Society of Civil Engineers.

Memorial

FRED P. CURTIS, president, and his brother, Lewis C. Curtis, vice-president, of the Lyman-Richey Sand and Gravel Corp., Omaha, Neb., recently gave a seven-room house to the Salvation Army in memory of Horatio F. Curtis, late retired president of the company, who was a supporter of the Salvation Army, although he had no official connection with it.



Carl A. Menzel, left, receives 1951 Award of the Concrete Reinforcing Steel Institute from Henry C. Turner, Jr., chairman of the Award Committee

Panama Cement Officers

DR. AUGUSTO S. BOYD has been re-elected president of the Panama Cement Co., Panama, R. of P., and Luis Martinz has been re-elected vice-president. Roberto Heurtematte has been appointed treasurer, and Inocencio Galindo V., has been named secretary. Eduardo Icaza A., Victor M. Tejeira and Demetrio Rusodimos have been elected directors of the company.

Discusses Gypsum

PAT PUCKETT, mining engineer for the Certain-teed Products Corp., Ardmore, Penn., recently gave a discussion on the gypsum industry at a meeting of the North Central Iowa Engineers Club, Ft. Dodge, Iowa. With the aid of a sound movie, "White Magic," Mr. Puckett traced, step by step, the quarrying and processing of gypsum and the manufacture of gypsum products.

Named Vice-President

J. A. HIGGS, formerly resident manager of the Massey Concrete Products Co., Atlanta, Ga., has been named vice-president of the company.

Service Manager

CHARLES W. STYERS, manager of the Columbus, Ohio, plant of Permacrete Products Corp., Lorain, Ohio, has been appointed field service manager in the Columbus area. In his new position, Mr. Styers will co-ordinate the manufacture and erection of "Corflor" roof and floor units, with Jerry Anderson continuing to handle sales and engineering details of the Corflor division. A. L. Kaschub, formerly manager of the Chicago plant, will succeed Mr. Styers as manager of the Columbus plant.

Sales Representative

ARTHUR H. SCHNEIDER, representative in the Texas Gulf Coast area of the Zonolite Co., Chicago, Ill., has been appointed sales and service representative in western Pennsylvania covering the area from Johnstown to Williamstown and Harrisburg. He succeeds Vaughn Monsell, who has been promoted to district manager in the New York City office. John P. Williams has been appointed western New York representative.

Elected Treasurer

WILLIS T. BELL has been elected treasurer of Kelley Island Lime and Transport Co., Cleveland, Ohio, in addition to his duties as secretary. He succeeds the late Fred W. Kuhl.

Appointed Director

PAUL KIRKBRIDE, superintendent of the Independence, Kan., plant of Universal Atlas Cement Co., New York, N. Y., has been appointed a director of Independence Industries, Inc., an organization chartered for the purpose of buying, renting, building real estate and property and promoting the industrial welfare of Independence, Kan.

Re-elect Cement Officials

GORDON TONGUE has been re-elected president of the Northwestern Portland Cement Co., Seattle, Wash. J. A. Reuter has been re-elected vice-president; J. D. Burns, chairman of the board; C. T. W. Hollister, chairman of the executive committee; D. G. Metcalf, secretary and treasurer; and H. Johnson, assistant secretary and treasurer.

On Executive Committee

CARLTON J. LEWIS, secretary and general manager of the Buffalo Gravel Corp., Buffalo, N. Y., has been elected to the executive committee of the General Contracting Employers' Association of Buffalo.

Shows Cement Film

ALBIN J. COOMBS, assistant chemist, Glens Falls Portland Cement Co., Glens Falls, N. Y., recently held a showing of a sound motion picture in color at a meeting of the Lions Club in Glens Falls. After the showing of the film, which depicted the manufacture of portland cement, Mr. Coombs answered questions concerning the cement industry.

Port Commissioner

MELVIN H. BAKER, president of the National Gypsum Co., Buffalo, N. Y., has been appointed a member of the Buffalo Port Facilities Commission by Gov. Thomas E. Dewey. He succeeds Stanley J. Bauer who resigned when elected to the State Senate.

Re-elected President

A. T. LOHMAN has been re-elected president and general manager of the Limestone Products Co., Cleburne, Texas, and J. Lambert Lain has been re-elected chairman of the board. The following directors have been elected: Dr. George H. Anderson, Dr. W. P. Ball, H. B. Bickers, John W. Carpenter, W. W. Conley, Lyn E. Davis, W. T. George, Preston M. Geren, J. Lambert Lain, Fred Dickson, J. T. Swatzell, and A. T. Lohman.

Addresses Research Group

FRANK T. SHEETS, president of the Portland Cement Association, Chicago, Ill., recently addressed coal and railroad executives of Bituminous Coal Research, Inc., in Columbus, Ohio, on the subject of "Applying Research Results to Markets."

Association Officers

DAVID J. WARSAW, president of the Hay-Con Tile Co., Detroit, Mich., has been elected president of the Concrete Products Association of Detroit. Benjamin Wilk, Standard Building Products Co., has been elected vice-president; Stanley Sochalski, Central Concrete Block Co., has been named secretary; and Martin Kostere of the United Block Co., Inc., has been made treasurer.

Named Directors

EMORY M. FORD, chairman of the Wyandotte Chemicals Corp., Wyandotte, Mich., and president of the Huron Portland Cement Co., Detroit, and Henry T. Bodman, general vice-president of the National Bank of Detroit, have been named directors of the Universal Products Co., Inc., Detroit.

Re-elected President

GEORGE A. DOBBIE has been re-elected chairman of the board and president of Gypsum, Lime and Alabastine, Canada, Ltd., Paris, Ont., Canada.

Association Treasurer

ALVIN W. OGDEN of the Universal Atlas Cement Co., New York, N. Y., has been elected treasurer of the Office Executives Association.

Sales Promotion Manager

A. M. NORTON has resigned as general sales manager of the United States Mineral Wool Co., New York, N. Y., to become sales promotion manager of the home and building sales division of the Baldwin-Hill Co., Trenton, N. J.

Heads Pipe Concern

B. J. UKROPINA has been elected president of the United Concrete Pipe Corp., Los Angeles, Calif. He succeeds H. Lloyd Nelson who has returned to the parent company, U. S. Pipe and Foundry Co., for a new assignment. Donald Ross, formerly first vice-president, has been named executive vice-president, and Steve Kral and T. P. Polich have been appointed vice-presidents.

Administrative Assistant

A. L. MEYER has been named administrative assistant to the general sales manager of Certain-teed Products Corp., Ardmore, Penn., in addition to his duties as merchandise manager of the gypsum and allied products division.

OBITUARIES

EARL GRAMER, SR., manager of the Elk River Concrete Co., Crookston, Minn., passed away recently after a long illness. He was 51 years old.

SAMUEL ROSOFF, well known builder of subways, roads and canals in the United States and many other countries, died April 9 at the age of 68. He was believed to have built more miles of subways than anyone else. He owned bus lines and railroads, and among other business enterprises he was in the sand and gravel business at various times. Mr. Rosoff left his native Russia after his father died, and worked his way to England on a cattle boat, where he got a job as a cabin boy on a ship that brought him to New York in 1892.

JOSEPH T. SMITH, a director of the W. H. Loomis Talc Corp., Gouverneur, N. Y., died March 23 at his home in Burlington, Vt. Mr. Smith had been a member of the board of directors since 1947 and was also a member of the executive committee. He was president of the Eastern Magnesia Co., Burlington, and vice-president of the Rock of Ages Company.

COL. HARRY A. MONTGOMERY, vice-president and chief engineer of the Material Service Corp., Chicago, Ill., died recently at the age of 53. Military services were held at Fort Sheridan. Col. Montgomery graduated from West Point in 1918 and served in both World Wars. He retired in 1947 and joined Material Service Corp.

FRANCIS MURT COOGAN, vice-president and director of the Alpha Portland Cement Co., Easton, Penn., died unexpectedly on March 31 at his home in Fairview Place, Phillipsburg, N. J. He was 73 years of age. Born in Pattenburg, N. J., Mr. Coogan joined the cement company in 1902 as traffic manager. He served successively as purchasing agent, sales manager, and secretary before being elected vice-president and director in 1917. Last January he was honored by the cement industry at a testimonial dinner in New York City in recognition of his achievements in solving problems of the cement industry. Mr. Coogan was also president of the Second National Bank of Phillipsburg and The First National Bank of Washington, N. J.

A. D. MACDOUGALL, owner of the Hanford Cement Products Co., Hanford, Calif., passed away recently after a long illness. He was well known throughout the West for his work in building irrigation projects, and was an active member of the Western Concrete Pipe Association.

CHARLES C. CUMBLER, who was operator of a stone quarry in Highspire, Penn., for many years, died March 22. He was 79 years old. Educated at Harrisburg Business College, Mr. Cumbler devoted his time to the quarry business for 28 years until the firm was sold to the Bethlehem Steel Co.

ANTONIO CICCONE, founder of the Ciccone Cement Block Co., and the Ciccone Cast Stone Co., Providence, R. I., died recently after a long illness. He was 71 years of age.

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TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.



INDUSTRY *News*

Depletion Allowances Granted

THE HOUSE WAYS & MEANS COMMITTEE rejected early in May administration proposals to cut depletion allowances for oil and gas, sulfur and nonmetallic minerals. Instead, the committee voted to increase the allowance for coal and to grant percentage depletion for the first time to a number of minerals. The depletion allowance for coal was increased from 5 percent to 10 percent. A 15 percent allowance was granted to many nonmetallic minerals, which included refractory and fire clay, quartzite, borax, fuller's earth, perlite, diatomaceous earth, metallurgical and chemical grade limestone and tripoli. Those granted a 5 percent allowance include sand, gravel, granite, marble, stone, brick and tile clay, shale and shell. The allowances voted, of course, may or may not finally be incorporated into the 1951 tax law to be written.

Convention Dates Changed

NATIONAL SAND AND GRAVEL ASSOCIATION and National Ready Mixed Concrete Association have announced that their 1952 convention-exhibit dates have been changed to the week of February 10, and will be held at the Stevens hotel, Chicago, Ill. The earlier date was decided upon after consultation with the National Crushed Stone Association and the Agricultural Limestone Institute, with whom N.S.G.A. and N.R.M.C.A. have cooperative dates in the convention-exhibit years.

National Crushed Stone Association and the Agricultural Limestone Institute will hold their meetings at The Stevens the week of February 17.

Railroad Car Shortage

NATIONAL INDUSTRIAL SAND ASSOCIATION voted at a special meeting in Washington, March 12, to authorize Sterling N. Farmer, association president, to write to the Association of American Railroads, emphasizing the crisis which its industry faces because of its inability to obtain railroad cars and asking for some assurance that relief would be forthcoming. Accordingly, Mr. Farmer wrote to A.A.R., presenting the industry's problem. It was stated that the industrial sand industry needs approximately 63 percent more cars than were loaded during the first quarter in 1950, which includes railroad cars in all of the principal categories. It was further stated that as the defense production program achieves greater momentum in succeeding quarters of this year, car supply requirements will increase at an even greater rate, because industrial sand plays a key role in defense production and in the fulfillment of essential civilian requirements. The industry has more orders on its books than it can service because cars are not available for loading.

In summarizing the industry's needs, Mr. Farmer stated, "We have the production facilities and the manpower to do our job, but unless there is an early and substantial improvement in car supply, some members of our industry face the necessity of seriously curtailing their operations or shutting down their plants."

Safety Course for Plants

THE NATIONAL LIME ASSOCIATION recently announced that the Bureau of Mines' safety service is available to all the industries under its jurisdiction, including the lime industry. This service is free to all plants wishing to participate and consists of a series of accident-prevention courses for the supervisors and workmen alike to enable them to become familiar with the mine and quarry safety technology that has been developed and accumulated by the Bureau. The service functions in the following manner:

1. Bureau safety men give the participating plant a thorough safety inspection, noting all unsafe practices and conditions.

2. From the results of the inspection report, a course is drawn up for the plant, usually consisting of two 2-hour classes per week for three weeks, the duration depending upon the number and types of unsafe conditions found during the inspection.

3. Since the success of the course depends almost entirely upon the enthusiasm and cooperation of the entire plant personnel, the Bureau safety men insist that all executives, supervisors and foremen, as well as the plant employes, be present at the class meetings.

S. H. Ash, chief of the safety branch of the Bureau of Mines, said that he would welcome any inquiry concerning this program, and that the Bureau's regional offices would be able to furnish full particulars. The National Lime Association expressed hope that many lime plants would avail themselves of this service.

Lightweight Aggregates

BUILDEX, INC., Pittsburgh, Kan., is building a new plant near Ottawa, Kan., for the processing of Kansas shale into lightweight aggregate for building materials use, both in block and in bulk for concrete mixes. The firm has purchased two quarter-sections of land for the operation, which is patterned after a plant located in the state of Washington. About 60 employes will be used at the Ottawa plant.

Vermiculite Insulation

THE HIGH VALUE of vermiculite as an insulation material was dramatically presented in a recent report published in *Business Week*. A 65-ton white-hot ingot, packed in vermiculite, was shipped from Sydney to Trenton, Nova Scotia, a distance of 200 miles. Traveling in a box on an ordinary railroad flat-car, the ingot reached Trenton at a temperature of 1575 deg. F., a loss of only 195 deg. during the trip. Normally, it would have taken six weeks to cool off the ingot before it could be shipped, and then, at Trenton, it would have taken days to heat it back to a workable temperature.

Cover Picture

COVER PICTURE on this issue shows a Joy Heavyweight Champion blast-hole drill in operation in the limestone quarry of Thomasville Stone and Lime Co., Thomasville, Penn. A 3-cyl. GM diesel engine furnishes power for the drill's rotary motion and also for propulsion, while a 6-cyl. GM powers the up and down motion of the drill and operates a compressor.

The Joy Champion, manufactured by Joy Manufacturing Co., is a continuous-type rotary drill that is now being used in a number of quarries. It is a self-propelled unit, mounted on crawler treads, which trams at speeds up to 5 m.p.h. Improvement in the design and construction of the rotary drill bits has extended its economic application from soft sedimentary formations to very hard and dense formations.

"Air-blast" cleaning is a comparatively new development in rotary drilling techniques. Cuttings are "blown" away from the face of the bit by a continuous blast of compressed air, forced down through the drill pipe. The volume and pressure of the air force the cuttings up around the outside of the drill pipe to the collar of the hole where they are picked up by a dust collector.

Warner Co. to Expand Facilities

RECENTLY REPORTED in the Philadelphia *Inquirer* was an article pertaining to the large expansion project of Warner Co. and other large companies of that area. The article stated that according to John Curtin, Jr., president of Warner Co., that section of the country is faced with what might be termed a revival in industrial and population expansion on the Delaware River from Trenton to Wilmington. He believed the greatest concentration of growth would doubtless appear in the Morrisville-Trenton area in New Jersey, where Warner Co. is "adding greatly" to its facilities. The construction by United States Steel Corp. of a large integrated steel mill at Morrisville is expected to be an important factor in the future of Warner Co. The article pointed out that the construction of the Fairless Works by U. S. Steel and the prospects of similar operations by other steel companies "are starting many collateral industries in the same area, and this expansion carries with it a vast range of projects for highways, bridges, power plants and general population needs."

Part of a new $3,000,000 to $4,000,000 expansion program now underway by Warner Co. includes the enlargement of its trackage, dry-bin facilities, and concrete mixing capacity at its Morrisville plant, as well as the addition of ten concrete-mixing trucks.

Warner Co. owns 6000 acres adjoining the land purchased by U. S. Steel, but Mr. Curtin said his company intended to continue to use this property for the production of sand and gravel.

By the end of the third quarter, Warner Co. hopes to have finished the construction at its Cedar Hollow plant of a large rotary kiln to provide for the increase in demand for dolomitic lime products. Also scheduled for completion in the last half of 1951 is the expansion of its concrete-mixing capacity at Morrisville. The company has also been pushing research and development work on new products based upon its high-calcium and magnesium limestone operations. These operations accounted for $5,790,472, or 29.6 percent of the company's total sales of $19,565,578 in 1950. Over 80 percent of the sales of these operations were chemical and industrial lime.

Warner Co. has perfected a new process to manufacture improved magnesia products for use in the chemical, industrial and pharmaceutical fields. A commercial unit to utilize this process is nearing completion at its Cedar Hollow plant.

The net income of Warner Co. for 1950 set a new record of $2,676,096, or $5.64 a share, excluding a net profit of $694,462, or $1.46 a share, from the sale of its McCoy dolomitic lime and stone plant near Bridgeport, Penn. Sales for the first quarter of 1951 were about 33 percent above the corresponding period of 1950, and the heavy demand for the company's products indicated near-capacity production for the remainder of the year. Despite the record profit for 1950, the expenditure of $1,900,000 on plant and equipment last year and the large expansion program now under way forced Warner Co. to sell $965,000 additional first mortgage bonds to Penn Mutual Life Insurance Co. on March 15, bringing its funded debt to $4,500,000. The company has now asked stockholders to approve an increase in its authorized debt limit from $4,500,000 to $7,000,000 in case further borrowing is necessary.



Shown above is the chorus sponsored by Besser Manufacturing Co., Alpena, Mich., as it appeared in concert for benefit of crippled children's fund of Michigan. Organized 3 years ago, it consists of 45 men, and is directed by Ralph Michaud

Portland Cement Production

THE PORTLAND CEMENT industry produced 15,201,000 bbl. of finished cement in February, 1951, as reported to the Bureau of Mines. This was an increase of 16 percent compared with the output in February, 1950. Mill shipments totaled 11,294,000 bbl., an increase of 15 percent over the February, 1950, figure, while stocks were 6 percent below the total for the same month in 1950. Clinker production during February, 1951, amounted to 16,995,000 bbl., an increase of 17 percent compared with the corresponding month of the previous year. The output of finished cement during February, 1951, came from 149 plants located in 35 states and Puerto Rico. During the same month of the previous year 13,115,000 bbl. were produced in 142 plants.

Coming Conventions

June 13-14, 1951—

National Agricultural Limestone Association, Mid-Year Convention, Hotel Sheraton, Chicago, Ill.

Wage and Salary Regulations

NATIONAL CRUSHED STONE ASSOCIATION issued to its members, on February 13, 1951, a "Summary-Guide to Wage and Salary Regulations," prepared by the association's counsel. Since that time, a number of general wage regulations and rulings have been issued by the Wage Stabilization Board, and N.C.S.A. has now issued a "Supplementary Summary-Guide." The supplementary guide includes General Wage Regulations 6, 8, 9 and 10.

Regulation 6 provides that increases in an appropriate employe unit which do not raise wage and salary levels more than 10 percent above the levels which existed at the first regular pay roll period ending on or after January 15, 1950, (the base period) may be made without prior board approval. The summary guide defines the following subjects pertaining to this regulation: Appropriate Employe Unit; Base Pay Period Levels; Increases After the Base Pay Period and Prior to January 26, 1951; Increases Subsequent to January 25, 1951; Retroactivity; and, Reporting Increases.

Regulation 8 explains cost of living increases—under what provisions they may or may not be made. Regulation 9 establishes the criteria to be followed in fixing wages, salaries and other compensations at plants which commenced operation after January 25, 1951. Regulation 10 is the regulation which permits the so-called "tandem" wage and salary increases and explains under what conditions these increases may be made.

Employers who are considering any increase in wages or salaries must submit four copies of Wage Stabilization Form No. 1 to their local office of the Wage and Hour Division. The forms are available at any division office. When collective bargaining units are acting for the affected employes, the name of the union must be listed and, wherever possible, both the employer and the union should sign the forms in these cases.

Imports Mediterranean Pumice

CINDER PRODUCTS CORP., Providence, R. I., has become the first manufacturer on the eastern seaboard to produce pumice concrete masonry units. The decision was the result of the shortage of lightweight aggregates. The company has purchased 20,000 cu. yd. of volcanic pumice stone from an island in the Mediterranean. The cargo arrived on the S. S. Pegor in mid-April and the company has already started production of block made with this lightweight aggregate. Cinder Products Corp. is also the distributor for pumice throughout Massachusetts, Rhode Island and Eastern Connecticut. The company was established in 1935 to produce cinder block. Since then it has expanded its services to include many other building materials for the construction field, the latest being pumice block. Royal Sterling is president of the company.

Limestone Meeting

IOWA AGRICULTURAL LIMESTONE Association, Inc., held its sixth annual convention, March 7-8, 1951, at the Savery Hotel, Des Moines, Iowa. Those who attended expressed themselves as believing the 1951 meeting was one of the best yet.

The first day was devoted mostly to meetings of the board of directors and the resolutions and nominating committee. At the business meeting the following day, Melvin E. Raid, Raid Brothers Construction Co., Denmark, Iowa, and Harry B. Green, Greene Limestone Co., Greene, Iowa, were elected new members of the board of directors. Also, C. M. Kirtley and K. K. Kinsey were re-elected. New association officers for 1951 are C. M. Kirtley, president, and Floyd H. Millen, vice-president.

Other program activities included the annual report of the association's activities during 1950; financial report; report on the National Agricultural Limestone Association's convention held at Washington, D. C., in January; report on the national convention of the Agricultural Limestone Institute, held in February at Cincinnati, Ohio; and several guest speakers. One of the guest speakers was Leland Carlisle, the senior student from Iowa State College who received the 1950 scholarship award given by the association to a senior student majoring in agronomy. In a few words he proved to his audience that he is not only a good scholar, but is a deserving young man who is very grateful for the assistance made possible by this scholarship award.

Another feature of the convention was the full-size billboard erected in the Grand Ball Room. Mounted on the 12- x 25-ft. outdoor billboard was the current association poster, "Help Check Erosion."



Top: S.S. Pegor arrives at plant with first cargo of Greek pumice. Bottom: A 20,000-cu. yd. stockpile of pumice to serve concrete block industry

Lime Production Outlook

OFFICIALS OF THE Defense Minerals Administration and representatives of the lime industry recently met to discuss the outlook for lime production, as affected by the nation's mobilization program. It was stated that in some localities where steel production has been increased, lime plants have been unable to fill all orders but, on the whole, the picture is good.

Since lime is used extensively as a flux in the production of steel, the increased demand for steel naturally reflects a greater need for lime. Total production of lime in the United States in 1949 totaled 6,318,302 short tons, of which approximately 3,500,000 tons were used in chemical and industrial processes, including steel making. D.M.A. announced that government assistance would be given to the lime-producing industry in the event that an expansion in production facilities becomes necessary.

Brazilian Cement Imports

ACCORDING TO A recent newspaper report, cement stocks now held in Brazilian customs houses will be released to importers upon a receipt of duties as stated in a report received by the American Brazilian Association. The duties paid will be returned when a pending bill to extend duty exemption on imported cement to December 31, 1951, becomes law. The bill has already passed the House of Representatives. The association cites a statement by the Minister of Finance that cement imports may be withdrawn upon deposit of duties and the signing of a bond agreeing to exclude these duties from the sale price.

Pavement Yardage

Awards of concrete pavement for the month of March and for the first three months of 1951 are listed by the Portland Cement Association as follows:

	Square Yards Awarded During March 1951	Square Yards Awarded During First three months 1951
Roads	2,325,967	7,924,473
Streets and alleys	1,904,070	5,369,824
Airports	689,750	2,111,503
Totals	4,919,787	15,405,800

Awards for the month of April and for the first four months of 1951 were:

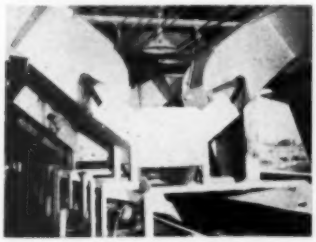
	Square Yards Awarded During April 1951	Square Yards Awarded During First four months 1951
Roads	1,957,179	9,881,652
Streets and alleys	2,035,823	7,405,647
Airports	965,594	3,077,097
Totals	4,958,596	29,364,396

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

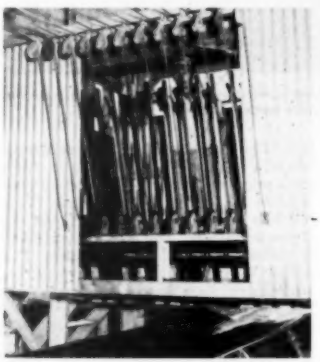
Blending Belt System

AT A WESTERN OPERATION all aggregates in the bins can be fed to a blending, or loading belt which runs flat and parallel to the long axis of the plant. The gates are on the end of the



Control station is located over loaded end of blending belt

steel chutes and are of the drop-quadrant type. Steel cables open the gates from a centrally-located control station over the loading belt. The station



Drop-quadrant gates are controlled from centrally-located station

is near the loaded end of the belt and is open on one side to allow the operator good vision of the belt below him. The two accompanying pictures show the neat and efficient layout of the plan.

Dial Scales

AT A LIGHTWEIGHT AGGREGATE calcining plant in Tennessee, the shale is bloated or expanded in two Vulcan rotary kilns. The finished material, crushed in a jaw crusher and a set of double-roll crushers, is screened through ⅜-mesh cloth. It is the aim of the operators to produce a Haydite-type of material that weighs 1600 lb. per cu. yd.

To insure high quality material, especially with reference to keeping the weight per cubic yard at the desired figure, the operators use a simple pair of dial scales with a metal container of known cubical content. As shipments are made, samples are taken from time to time and weighed. The bucket is filled with the lightweight aggregate, compacted slightly and the excess scraped off so as to maintain a constant volume. A simple calculation gives the weight per cubic yard of the material.



Dial scales to control product uniformity

Gyratory Screen

A PUMICE SCREENING OPERATION in the Southwest uses Symons gyratory screens to classify the finer sizes (minus ¼ in. to 20 mesh). These screens, because of their high capacity and ease of installation, have found many similar uses in the West.

The illustration shows how one of these vertical screens was installed. At the top is a small vibrating screen from which the plus ¼-in. material (oversize) is chuted to the belt conveyor at right while the throughs drop into the gyratory screen directly under the vibrator. The gyratory screen, which is enclosed in a rectangular steel housing unit, prepares two sizes of material—dust and a plus 10-mesh minus ¼-in. product. The dust is later rescreened in another gyratory screen, producing a plus 10-mesh minus 20-mesh product.

Efficient Truck Maintenance

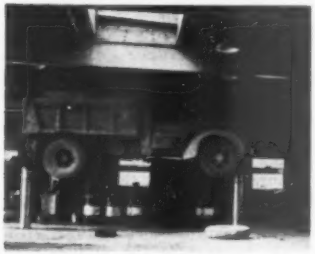
WITH THE GROWING and widespread use of trucks in the aggregate business, the work related to truck upkeep and maintenance requires nearly as much attention as producing the aggregate, unless time-saving facilities are available in the company's garage.

Facilities of an operator in the Northwest who also is in the ready-mixed concrete business, show the extent to which producers have gone to keep truck maintenance expenses to the minimum by providing adequate facilities to keep all truck units properly lubricated. In the garage a dual-lift grease rack is provided so that the heaviest rolling equipment can be easily handled. Also, a pressure system has been installed so that all lubricants of reasonable viscosity can be used in barrels and with a minimum amount of handling. Four hose reels take care of the lubrication and air



Oversize is chuted to belt at right; gyratory screen classifies the finer sizes

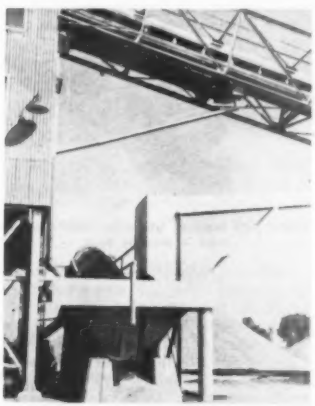
hose when not in use. The first hose is for air; the second is the transmission and differential grease hose; the third is the chassis lubrication hose, and the last hose is for motor oil. A similar setup could be a great convenience in any garage.



Equipment for easy truck lubrication and inspection

Marketable Fines Recovered from Rinse Water

AT A SAND AND GRAVEL OPERATION in the West, all gravel products from the screening plant are given a final wash over suitable vibrating screens before being placed in bins. The small amount of adhering fines is collected



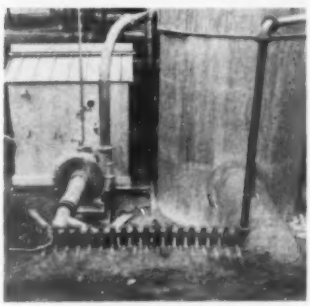
Fines rinsed from gravel before storage are dewatered in this classifier and stockpiled for sale

and put through a long inclined steel launder and chuted into a 48-in. Wemco sand machine. This machine discharges a dewatered product to an off-bearing conveyor belt and thus the fines are stored separately on the ground. A relatively small amount of material is collected and it varies widely in size but is all minus ¼ in. It is sold for drive-way surfacing and other special purposes so no great amount accumulates around the plant. The installation is a neat arrangement that contributes a valuable by-product incidental to keeping a clean plant.

Flushing Clogged Lines

AT A PHOSPHATE PROCESSING plant in Florida, a 300-ft. dia. picket-rake-type Dorr thickener is used in a 750-ft. dia. settling area. This means that there is a circular band around the perimeter that is not reached by the rakes. As settling of the fine slimes progresses in the outer area, they continually slough off into the area swept by the rakes. By the use of picket-type rakes, better compaction occurs in the thickener and a higher solids content of the discharge pulp is obtained.

In such a large diameter thickener it is imperative to keep the pipe lines to and from the thickener free at all



Valve arrangement controls high pressure water for flushing out clogged lines

times. The arrangement of valves shown in the illustration is for controlling high-pressure kicker water. The valves are used only for flushing out clogged lines. The pump is a part of the assembly and is a Georgia Iron Works unit.

Rebuilding a Cutter

AT A FLORIDA OPERATION, a 20-in. Amsco suction dredge equipped with a Swintex cutter delivers fine sand to the processing plant. The dredge handles around 1200 to 1400 t.p.h., so there necessarily is much wear on the

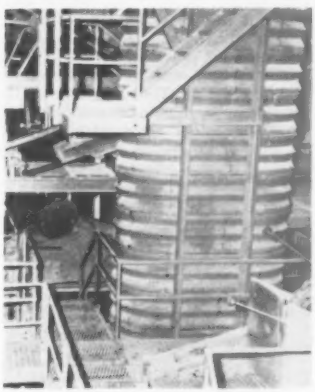


Chalk marks on worn cutter indicate place and type of repair to be made

cutter. When the amount of wear becomes advanced, the cutter is taken to the company's repair shop and rebuilt by the use of hard surfacing alloys such as Stoodite. The cutter shown in the accompanying picture has been checked by one of the staff, and the chalk marks indicate where and what type of repair is necessary.

Elevator Housing

AT A LARGE CRUSHED STONE operation in the mid-south, the housings of the bucket elevators are made of 7-gauge tunnel-liner plate. This material, which is normally used for culverts, has proven ideal as an elevator enclosure. Each housing has elliptical ends and straight sides, with a major axis of 6 ft. (parallel to sides) and a minor axis of 4 ft. The plates are 18 in. in depth and flanged for a bolted connection between rings. The elevator drive is mounted on a frame at the top of the housing. The illustration shows one of these elevator housings.



Bucket-elevator housing of bolted tunnel-liner plate

Portable Underground Switchhouse

SOUTHWEST POTASH CO. is making installation of portable switchhouses which are being used underground for the first time to protect mining machines, drills, blowers and rectifiers for shuttle car power supply. The unit was supplied by Westinghouse Electric Corp.

The switchhouse will be used to isolate individual mining equipment setups from a main 4160-volt primary cable, without disturbing continuity of service to other feeders. It will be used at the point where the feeder is tapped off the primary cable, protecting a portable transformer substation and the mining equipment that it serves. Maximum height of the unit will be 42 in. Portability is achieved by mounting the switchhouse on a steel skid plate.

New Machinery

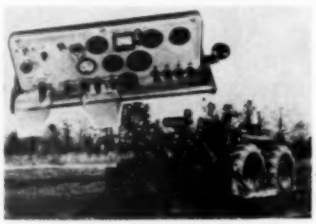
ROCK PRODUCTS

Truck Development

FEDERAL MOTOR TRUCK CO., Detroit, Mich., is in the process of equipping all of its heavy-duty trucks with advanced design Timken FD-900 and FE-900 series front axles. Company engineers claim that the new axle design offers greater front-end stability, increased maneuverability, reduced maintenance, greater safety and overall ruggedness with a minimum of weight.

Improved Bulldozer

R. G. LETOURNEAU, INC., Peoria, Ill., has incorporated two new improvements in its high-speed, rubber-tired Tournadozer: a torque converter and electric control. The torque converter is the single-stage type, which acts as an hydraulic transmission and combines the advantages of an hydraulic torque converter and an hydraulic coupling. The various gears in the transmission now are controlled by electromagnetic valves placed in the air lines going to the clutches which



Earthmover with torque converter

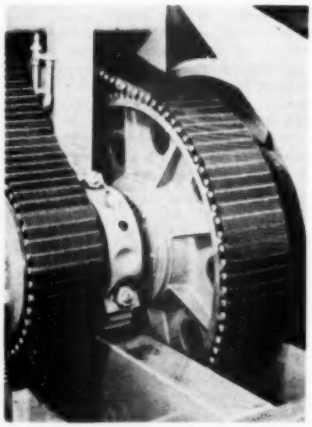
engage the transmission gears. Another development is that electrically-controlled steering is now accomplished by use of a toggle switch mounted on the control panel.

Electric Tachometer

U. S. ELECTRICAL MOTORS, INC., Los Angeles, Calif., has announced the development of an electric tachometer arrangement designed for motor applications that require continuous and accurate speed indication. This Model R-1 tachometer and generator is available in ratings from ¼ to 50 hp. and speeds from 2 to 10,000 r.p.m.

Chain Drive

MORSE CHAIN CO., Detroit, Mich., has developed a power transmission chain drive, which features new design principles and is called the Hy-Vo (high velocity) chain drive. The manufacturer states that it provides a power transmitting medium that combines the ruggedness and dependability of a gear drive with the smoothness and lack of vibration of a belt. Company engineers emphasize that Hy-Vo in no sense replaces present Morse roller or silent chain drives, but rather supplements them. It is designed specifically for speed applications higher than conventional chain drives, and to replace unwieldly belt drives now required for high-speed power transmission.



Power transmission chain drive

Long Truck Bodies

BAUGHMAN MANUFACTURING CO., Jerseyville, Ill., has in production truck bodies which are said to be the longest screw-type self-unloading bulk cement bodies manufactured. The body is 35 ft. long, built of high tensile strength alloy steel, and will carry 175 bbl. of bulk cement.



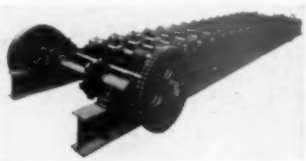
Rear-view of self-unloading bulk cement bodies

Electronic Recorder

LEEDS & NORTHRUP CO., Philadelphia, Penn., has announced a Speedomax electronic recorder which is said to feature a range continuously adjustable over a 20:1 ratio, and zero suppression adjustable over more than twice the maximum range. The manufacturer states that through the use of a particular suppressed zero range, an operator can ignore that portion of the range in which he is not interested, while he spreads the millivolts he wants to watch across the entire width of the instrument chart. Adjustable range permits the user to select his own scale calibration at will.

Pan Feeder Lubrication

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has in production two new types of lubricating systems for the heavy-duty manganese steel pan feeders. Both systems employ tubing to all bearings for distribution of the lubricant. In one system, the tubing is brought out to one side of the



Feeder with bearings lubricated simultaneously from a pressure tank

feeder, and each bearing is individually lubricated through alemite fittings in which the individual tubes terminate. In the other system, the tubing is brought out to one side and all tubes terminate in a central system, whereby all bearings are lubricated simultaneously from a pressure tank.

Tractor-Shovel

THE FRANK G. HOUGH CO., Libertyville, Ill., has developed the Model T12, an addition to its tractor-shovel line. The manufacturer states that the



Track-type tractor and shovel

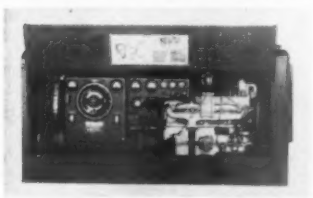
basic feature of this machine is the fact that it is a complete, integrated design of track-type tractor and shovel rather than a front-end attachment for a conventional crawler tractor. Bucket capacity is 1 cu. yd. and the horsepower is 67 with either gasoline or diesel engine available.

Portable Air Compressor

INGERSOLL-RAND CO., Phillipsburg, N. J., has announced a large size portable rotary air compressor designated as the Gyro-Flow 600. It delivers 600 actual c.f.m. air at 100 p.s.i. Advantages claimed by the manufacturer are simplicity and low cost of operation and maintenance, reliability, lighter weight and a discharge temperature at least 100 deg. F. lower than that of conventional portables.

Welding Generator

HOBART BROTHERS CO., Troy, Ohio, has announced as available a 300-amp. gasoline engine driven arc welder with 3-kw. auxiliary power generator,



Gasoline engine driven arc welder

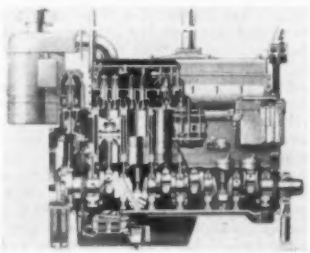
which provides for lights and such tools as a lathe, grinders, drills or a brake liner. This unit is self-contained, powered by a 6-cyl. self-starting Chrysler engine and completely enclosed by a sheet metal canopy bolted to the frame. The welding generator is rated at 40 volts, 300 amp. under one hour resistance load at 1500 r.p.m. and has a current range from 50-400 amp.

Extends Tractor Line

AMERICAN TRACTOR CORP., Churubusco, Ind., has added the Model GT-25 Terratrac crawler tractor to its line. The manufacturer reports that the units are powered by 4-cyl. gasoline engines, providing over 20-drawbar hp. and 25-belt hp., and that the pull in first gear exceeds 3000 lb. Other features include clearance of over 20 in., track gauges from 36 to 72 in. wide, and an hydraulic system for operating such attachments as bulldozers, loaders, winches, earth drills and cranes. Total weight is approximately 3290 lb.

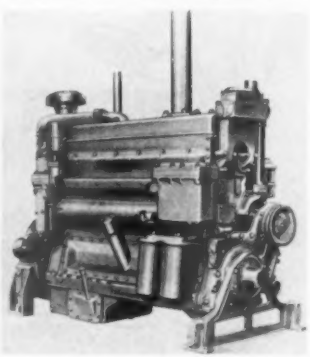
Extends Diesel Line

CATERPILLAR TRACTOR CO., Peoria, Ill., is in the process of developing two new diesel engines, the D337 and D326. The 6-cyl. D337 engine is an industrial version of the 5¼- x 6-in. engine developed as a power source for the DW20 and DW21 tractors. The



Longitudinal cutaway of D337 showing fuel pumps adjacent to each cylinder

D326, although quite similar in design, will be offered with a lower horsepower range. One new feature on both models is the fuel system with fuel pumps mounted adjacent to the cylinders they serve. This results in standard short fuel lines for each cylinder. Other features are new arrangement of oil-cooled pistons, the



D326 engine showing lube-oil filters and fuel filters

incorporation of fine filtration elements, which handle the full flow of oil to the engine system, and a completely redesigned 25-hp. vertical gasoline starting engine.

Side-Dump Trailers

EASTON CAR & CONSTRUCTION CO., Easton, Penn., has announced its line of side-dump trailers for mining and

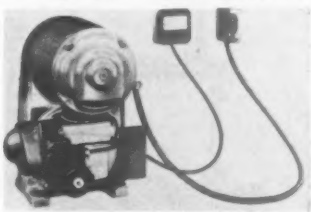


Two-way side-dump trailer

quarry haulage. Models TP-1114, TP-1317 and TP-1520, 14-, 17- and 20-tons rated capacity, respectively, are all doorless, pan-type trailers which may be dumped to either side. The trailer is furnished as a complete unit with rubber-mounted fifth wheel, with mounting brackets and bolts as illustrated.

Power Drives

STERLING ELECTRIC MOTORS, INC., Los Angeles, Calif., has in production Speed-Trol electric power drives in the single phase capacitator type de-



Electric power drive of new design

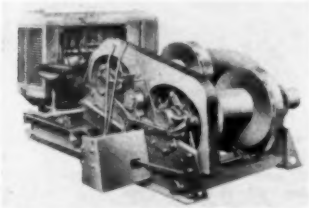
sign. Ratings are from ⅛ hp.-3 hp. inclusive, and the motors are said to provide infinite speed variation in almost any given range. Either 2:1, 3:1 or 4:1 speed variations. and 18 different maximum speeds from 2000 r.p.m. down to 52 r.p.m. inclusive, are available.

Steel Enclosed Breakers

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., has announced that its low voltage air circuit breakers, previously available only as bare breakers or in metal-enclosed switchgear, can now be had for individual mounting. The individual, stationary mounted breaker has a sheet steel enclosure formed and welded into a housing that encloses the circuit breaker and cable connections. It is said that the breakers are particularly effective where frequent operation is expected: for protection of lighting loads and small transformers, across-the-line starters and as back-up protection for motor starters.

Adds to Hoist Line

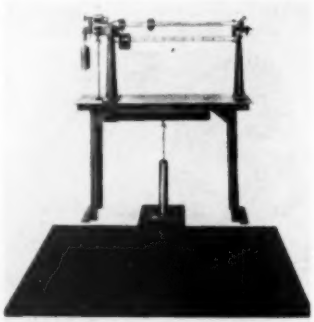
CLYDE IRON WORKS, INC., Duluth, Minn., has developed an 8000-lb. line pull hoist, known as Frame-5. The manufacturer claims that the band friction clutches enable the operator to handle full capacity loads with ease; equalized linkage gives smooth and even friction engagement and release; and outside friction surface affords better heat dissipation.



Hoist with 8000-lb. line pull

Beam Scale

THE YALE & TOWNE MANUFACTURING CO., Philadelphia, Penn., has designed a platform beam scale, said to be suitable for fast and accurate low-

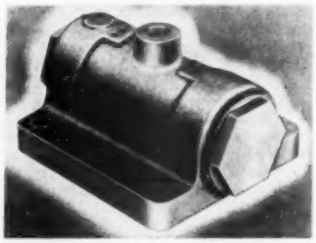


Platform beam scale

cost industrial weighing applications. The company states that since key parts are of all-steel construction, the scale is designed primarily for applications where "shock-loading" is the rule. The unit is built in capacities up to 6400 lb., and platforms range from 46 x 36 in. to 76 x 54 in.

Pneumatic Vibrator

SPO INC., Cleveland, Ohio, has announced the design and production of its Series No. 82 cradle-mounted pneumatic vibrator which delivers hammerlike impacts in a direction either parallel or 90 deg. to material flow. These units are recommended for permanent installation on conveyors, hoppers, screens and other types of materials handling equipment. The air vibrator bodies are cast in one piece from high tensile strength steel and are attached by means of four or six



Cradle-mounted air vibrator

bolts. At present they are available in 1½-in. piston dia. size, with operating speed regulated by varying the air line pressure.

Power Sweeper

G. H. TENNANT CO., Minneapolis, Minn., has developed a 36-in. vacuum-equipped sweeper for salvaging dust in cement plants and mills. Operated by one man, the sweeper has a reported capacity of 15,000-50,000 sq. ft. per hour. The dust pick-up is accomplished by rotation of a fiber or steel wire brush inside of a vacuum-equipped compartment. As the brush spins, heavier dust is drawn forward into a 9-cu. ft. hopper, while an 11-in. vacuum fan draws lighter dust into a heavy fabric bag. The sweeper is powered by a 6-hp. gasoline engine and has forward and reverse gears, brakes, horn, self-starter and storage battery.

Tractor-Shovel

THE FRANK G. HOUGH CO., Libertyville, Ill., has announced the Model HY Payloader tractor-shovel, which has a 1¼-cu. yd. bucket and is available with 60-hp. gasoline or diesel power. Features include hydraulic power control of bucket-dump and bucket-close; full-reversing transmission giving four speeds in each direction up to 29 m.p.h.; and digging angle or bucket pitch adjustable between 1 and 6 deg.



Tractor-shovel with 1¼-cu. yd. bucket

Tungsten Carbide Bit

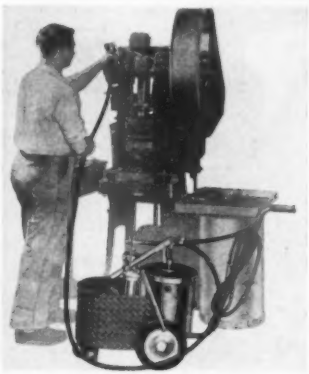
ROCK BIT SALES & SERVICE CO., Philadelphia, Penn., has announced the addition to its line of crown carbide Rok-Bits of a tungsten carbide bit of the conventional flat-top type. This bit is especially suitable, according to the manufacturer, where limited budgets are involved.



Sweeper for keeping plants free of dust

Grease Rig

GRAY CO., INC., Minneapolis, Minn., is manufacturing a Lube Service Cart for dispensing lubricants to industrial bearings. The company claims that since all grease and oil equipment

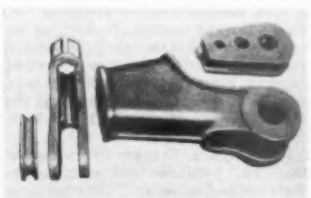


Cart for dispensing lubricants

on the compact rig is removable, even remotely located machines which are inaccessible to the cart can be greased with the equipment. Two models are available, one dispensing grease from a bucket-type unit which holds 30 lb. of grease, the other pumping from a 25- to 40-lb. refinery-filled pail. Each has a 10-ft. high pressure hose with control valve, and both feature high pressure and volume greasing.

Dragline Sockets

BAER STEEL PRODUCTS, INC., Auburn, Wash., is producing wire rope sockets which are said to reduce dragline rope breakage since the socket and wedge grip the rope in true-circle seats, and are matched to the size rope for which they are specified. Open and



Wire rope sockets

closed end and crowfoot drag sockets come in sizes from ½- to 2¼-in. rope and are available in Fibraloy cast steel.

Loading Shovel

SERVICE SUPPLY CORP., Philadelphia, Penn., has in production the Lodover, a 1-cu. yd. combination overhead and front-end loading tractor shovel for International crawler tractors. It is said that because of the elimination of turns, output is increased, tractor-life is prolonged, and operation in restricted quarters is made possible. Many attachments are available for the unit, including hydraulic dozer and angle blades, lift forks and crane booms.

Reclosing Relay

GENERAL ELECTRIC CO., Schenectady, N. Y., has announced a reclosing relay, specifically designed for use on automatic reclosing equipment with all types of power circuit breakers. It is said that new features of the relay are optional automatic reset at a definite time after any successful reclosure attempt; a self-contained means for permitting instantaneous initial and time-delay subsequent breaker tripping; and faster immediate reclosure.



Reclosing relay for power circuit breakers

Clutch Coupling

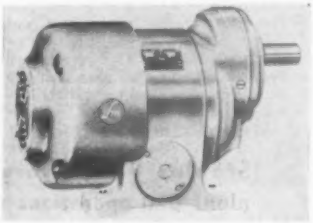
AUTOMATIC STEEL PRODUCTS, INC., Mercury Clutch Division, Canton, Ohio, has brought out the Series "E" Mercury clutch coupling, a complete unit with provision for mounting a standard flexible coupling between it and the driven load. The coupling is designed especially for installation on the shafts of integral horsepower electric motors up to 15 hp. rating.

Welding Rod

ALLOY RODS CO., York, Penn., has in production an oxy-acetylene welding rod for hard facing against medium impact and high abrasion. It is a centrifugally cast rod consisting of wear-resistant chromium carbides contained in a hard iron, chromium, manganese alloy matrix. The manufacturer states that hardness of deposited metal is 56-58 Rockwell "C." Sizes are available in ⅛ in. diameter by random lengths; 5/32 to ⅜ in. diameters by 14 in. lengths.

Geared Motor

STERLING ELECTRIC MOTORS, INC., Los Angeles, Calif., has introduced

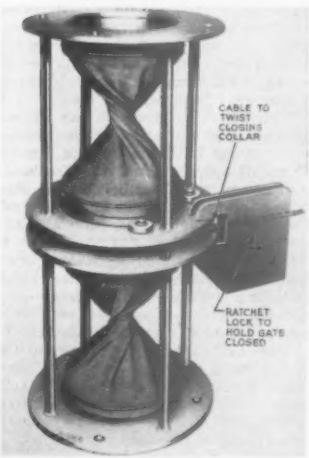


Single reduction motor

improvements on its "Slow-Speed" geared motors. This new type geared motor is of single reduction, "Klosd-Tite" construction for atmospheres containing non-explosive dusts, vapors and injurious foreign materials. An external fan forces cool air over the case of the totally-enclosed motor. Output shaft ratings are the six AGMA speeds starting at 780 r.p.m. down to and including 280 r.p.m.

Bin Valve

STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Ill., is producing the "Twistite" double-closure bin valve which consists of two rubber sleeves joined by a rotating steel collar. The valve is self-opening, the elasticity of the rubber sleeves causing them to resume their cylindrical shape when tension on the cable is released. The valve can be hand-controlled or automatically-controlled by the use of a small actuating motor. The standard 6-in. valve weighing 35 lb., with the ratchet cable-lock mounted on the frame, will handle lump sizes up to 2½ in. and requires a 30-lb. cable pull for closure.

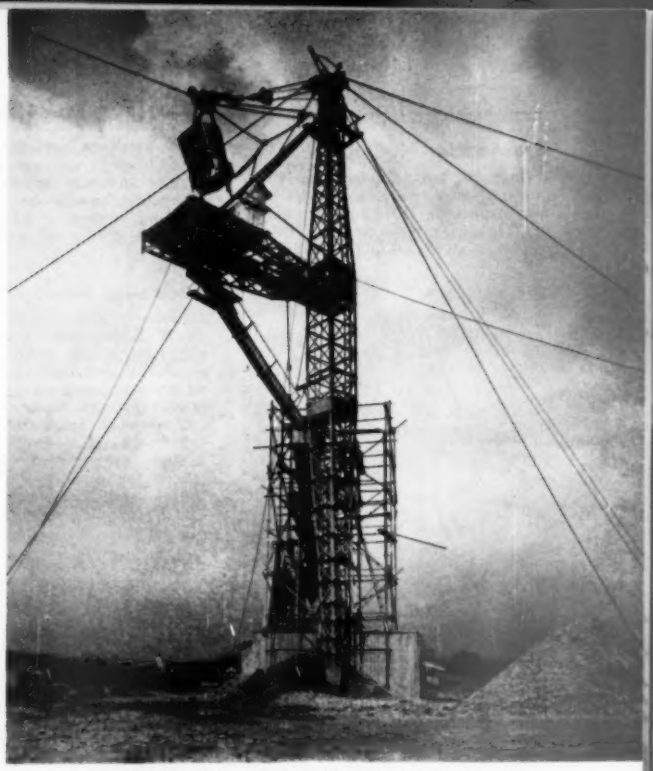


Self-opening bin valve

Producing Sand and Gravel in England

Stanley Ferry Gravel Co. plant and operations typify modern practice. Equipment shortages and land restrictions handicap producers

By CLARENCE MAW*



Slackline cableway mast installed at English gravel company

CAN THERE BE a more pleasant sight to a gravel man than a truck loaded with clean, washed and well-graded gravel threading its way through the town's traffic?

I am not the type who finds it hard to leave behind the cares of business, but this truck *had* something which set me musing. Its sideboards, in bold yellow inscription, bore the words "Mix With Us."

The slogan seemed an appropriate heading for the article my U.S.A. correspondent (the editor) urged me to send to you readers of ROCK PRODUCTS. Most appropriate, I mused, because that is exactly what he was asking me — an Englishman — to do. Nothing easier or, I faltered, was it?

You see, I do mix with our gravel producers, as an active national councillor of our Trade Association. I meet them all over England and Scotland, and assure you that their varied dialect is frequently harder to understand than any I might bump into at, say, your national industry conventions. But, then, I know their plant operations, their public, their national legal problems, selling and producing conditions, whereas comparison with yours, honestly, gives me stage fright.

You see, I have never been to the U.S.A. and the Americans I've met were those grand service boys and girls you sent here, and who quickly settled among us in the lovely rural countryside of my Yorkshire county.

Our English representatives of industry, upon return from visits to your country, have issued such alarming reports of outputs per man-hour, the costly large and modern plants you operate, the astronomical tonnages produced per day, the great areas you serve, and from the way they have flayed us for our slothfulness, I fear my modest account of gravel production in Yorkshire must seem to your readers "small town" by comparison.



The author

Well, so be it. War, high taxes, rigid economy by the national government on capital building and restrictions to the engineering of plants have limited gravel output here to an extent which I presume will not add up to your people. However, this is no apology. We get by, and provide service to the country at relatively cheap prices.

One other factor is that the development of land here, in general, and more specifically for gravel extraction, has, by partial state annexation in 1948, created complex problems. Demands for restoration of pits, and the royalty per ton state tax have ordered a new way of life. (The new Town and Country Planning laws which prevail have been discussed in a letter to the editor, ROCK PRODUCTS, May, 1951, page 108).

My company, Stanley Ferry Gravel Co. Ltd., produces and operates in the midst of a large industrial area of the West Riding of Yorkshire, surrounded by coalfields, heavy industry, and of course the large textile area in which are made the lovely cloths, silks, worsteds and suits known around the world.

The towns are so close together that in certain areas they run into each other with no apparent dividing line. Nevertheless, Yorkshire is a large and lovely rural county and I would rather write about its virtues than about the tools we use to bespoil it in the interests of what is called "civilized progress." However, as

*Manager, Stanley Ferry Gravel Co., Ltd., Leeds, England.

someone said about lawyers, they have to live, but God knows why.

Geography of Region

Yorkshire is divided into three Ridings (political subdivisions). North Riding is mainly agricultural with high and hilly contours, 1000 to 2400 ft. It is limestone country, lying north of York and Ripon, and has 1,362,058 acres with a population of 500,000. East Riding, in contrast, is flat, arable, chalky and is largely agricultural to the coast. It is east of York, has 750,115 acres and a population of 483,000. West Riding is thickly industrial and has a centrally located coalfield 45 miles wide by 20 miles. Its people are tough, rough and bluntly outspoken, but exceptionally hospitable. The population is 3,500,000 in an area of 1,773,529 acres.

I note the coalfield specifically, because my company's operation is located in the area and coal nodules, or lignite, sand-coated or in fragmentary dust form, occur near the surface. Its removal is a difficult operating problem that tests our mechanical ingenuity, and is not the least of our producing adversities. I shall later refer the problem to your plant research experts. Moreover, we are low lying in the River Calder terrace, and fog, ever prevalent from early November to February, is another ghost which elects to appear in a peak delivery period. The pre-winter hustle for aggregate before Jack Frost descends is a trial in these fog phases.

West Yorkshire is roughly grouped into three river terraces: (1) River Calder reserves, (2) River Wharf reserves, (3) Rivers Nidd and Ure.

Each is south, northwest, and north of Leeds. All these feed into the West Riding and as far as Lancashire, and are in close but not keen competition.

Gravel Operations

There are 16 sand and gravel operations in the Calder and Wharf reserves and five in the Nidd-Ure reserves with an aggregate total output of 900,000 tons annually. Some 1050 acres are either owned or leased, and have producing depths from 12 to 40 ft. They average 25,000 tons per acre, and, generally, are lagooned, with the water table 8 to 10 ft. below ground level.

Production varies from as low as 100 tons per 8-hr. day to as much as 800-1000 tons per 8-hr. day. Only five producers reach an output of over 100,000 tons annually and they supply the bulk of the tonnage.

The Calder reserves yield, per processed ton, 55 percent gravel which rarely exceeds 3-in. size. It is naturally spherical and is graded to ¼ in. with 45 percent excellent coarse grit sand. The gravels range, geologically, from pink granite from glacial drift exodus West Scotland, Lakeland shale, chert and sandstone, and millstone grit with numerous flats. The harder types plus limestone blues appear nearer the North Yorkshire hills in the Nidd-Ure reserves.

Many of our producers have vehemently said to me, "Look at this large and modern producing plant shown in glowing colors on page after page of your ROCK PRODUCTS." You have excavators in excess of 1½-cu. yd. capacity, scrapers, Caterpillar tractors, Euclids, crushers of large capacity, conveyors and the like, which can be picked off the shelf, while we must carry on with plants that should have been written off years ago. Our engineering concerns have not fully recovered from the war switchover, and our credits abroad have been war-dissipated, and we cannot buy there. Hence there naturally are delays in building new plants. We improvise, adapt, and grimly hang on, often casting that envious look at your journals despondently. This pungent comment is not by way of complaint, but I know that our producers resent being talked down to as backward boys by visitors and politicians. Our producers were once very up-to-date, and will be again. I speak with conviction, personally, having only recently placed orders for two large capacity excavators, and attempted to buy a Caterpillar tractor and an 8-cu. yd. scraper. On excavators, the delivery period was 2½ years, and I found that dollars were not available for Caterpillar tractors.

I visited a manufacturing plant to root out the problem, and found that the entire year's output of 1½-cu. yd. excavators was sold to Brazil. Currency restrictions have kept us to our existing plants and with the consolation that our producers initially bought good quality plants and have, mainly, in their own repair shops been able to keep them in very sound repair. I should like to elaborate on this point and, for that matter, compliment some U. S. manufacturers.

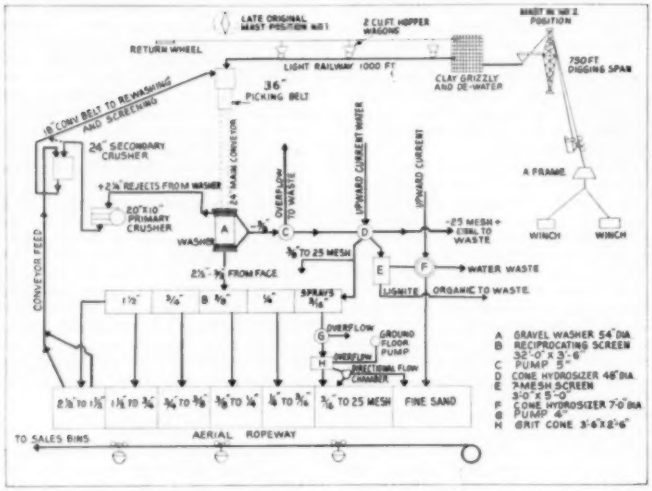
Cableway

My company, in 1932, installed a Sauerman cableway excavator for £2228, or what was then perhaps around $9000. This plant is as good today, if not better, than when we first bought it. Between 1932 and 1949 it excavated and yielded to the cantilevered hopper 1,905,602 tons, and I





Top: Concrete superstructure of the crushing and screening plant. Bottom: Sales hoppers located across a canal from the crushing and screening plant. The hoppers are filled by an aerial ropeway



Flowsheet of Stanley Ferry Gravel Co., Leeds, England

am not ashamed to admit that it will yet have to produce 840,000 tons more, in seven years life, before it is retired. I do not know any person concerned with the manufacturer—in fact we bought through an English agent in our County—but I give the equipment a high rating for performance. Up to 1949, the capital cost divided by the 18-years' output of approximately 2,000,000 tons so far works out at 0.29 cents per ton capital cost.

Stanley Ferry Gravel Co. Ltd., was founded in 1932 by its two directors, the late Harold Arnold, and Edwin Arnold (our present managing director) who were large building and civil engineering contractors. This was not our initial interest in gravel production. We had roots in gravel, so to speak, as far back as 1919, and at that time reinforced concrete construction here was in its infancy. Our output was around 30,000 to 40,000 tons annually. Few producers were in existence at the time, and we had to buy reserves to keep our contracts going. I well remember a concrete structure 50 ft. high with the winch and mast erected high on top, a shadow of the Sauerman, a screening plant acquired from some firm in Philadelphia which included a flat shaker screen which fitfully screened and blinded to vexation. It all brings me to thoughts of gravel plant progress, the change from flat screens to rotary screens, and back to shaker-vibratory and modern reciprocating types with the last word in bearings and knife-edge balance.

Exhausting our reserves in 1931, we moved to Stanley (Wakefield) 12 miles from Leeds, with many orders on hand, a lot of experience (we thought then) and new reserves of some 184 acres with a life of 45 years at an estimated rate of production of 125,000 tons annually.

The reserves presented topographical difficulties, lying virtually in an island. It was low lying with a 9-ft. ground level water table and its boundaries contiguous to two colleries and, as I have said, in a basin subject to fog. The nearest public highway had to be reached from the reserves to the sales hoppers through use of an aerial ropeway. We were not allowed to tunnel under the canal, and the ropeway, with its 23 cars, limits the daily output.

Late in 1932 we erected a 90-ft. Sauerman mast in position No. 1 (see drawing) at the foot of the main conveyor with 150-hp. drive, and with the cableway excavator on a digging radius of 750 ft. with 2-cu. yd. bucket delivering into the cantilevered hopper seen in the photograph. At that time there was a twin battery, of four cylindrical chambers each, "Pool" make washer and screens, and, since then, several replacements with other type units have taken place, and the old layouts discarded.

By 1945, war-worn units were retired or newly fabricated. By that time the Sauerman mast and equipment, also rejuvenated, was relocated in mast position No. 2, as can be seen from the extended boundary curve. The 7-day weeks of the war years, extended daily working hours and limited time available for making repairs made it impossible to undertake major overhauling with the result a new layout was planned in 1944.

The new 100-ft. high, thick reinforced concrete superstructure took shape around the existing one.

The new layout was, so far as English plants are concerned, of the latest design and, moreover, contained units not seen elsewhere in England. We had, among other equipment, incorporated revolutionary units for removal of lignite and excess fines and hydrosizing units.

Material Flow

Material from the pit is delivered at the rate of 80-100 t.p.h. by the Sauerman, excavated from a tightly consolidated face. From the mast hopper, it is chuted to a clay grizzly and then to a dewaterer below the mast from which it is discharged into a 2-cu. yd. ropeway clipped overhead and transported some 1000 ft. to a discharge hopper. It then is put over a picking belt discharging onto the main conveyor, and from here, gate controlled, rides a 24-in. belt on 223-ft. centers, traveling 150 f.p.m. at the rate of 100 t.p.h. The conveyor discharges into a "Seeley" type (Corts make) washer, which is a 12-ft. long x 4½-ft. dia. rotary washer, of 5/16-in. plate with ½-in. thick renewable liner plates, ¼-in. spiral segments and agitating angles. A rejector cone having 2¾-in. perforations and discharge drum delivers washed gravel to screens of the reciprocating conveyor type which is finely balanced and runs so smoothly and vibration-free that one can balance a coin on the bedframe. This has a screening capacity of 75 t.p.h. Sizes produced are 3/16 to ⅜ in., ⅜ to ¾ in., ¾ to 1½ in. and 1½ to 2¼ in.

The washer is located on one of the five floors (No. 2 floor). Material first enters the washer (or scrubber), the gravel is put over screens and the coarse grit sand is given an initial wash in the Seeley washer. It is then delivered to a sand sump tank and is pumped by a 5-in. Vacseal pump under 33-ft. head to a 4-ft. 6-in. diameter cone hydrosizer. The hydrosizer has a capacity of 500 g.p.m. of water and 50 t.p.h. of solids. Output from this unit is 35 t.p.h. of 3/16-in. to 40-mesh product.

Cone Hydrosizer

The cone has a 24-in. sorting column and the material discharges through a spigot-controlled discharge valve. Two inlets admit the upward current water into a teeter chamber at the rate of 120 g.p.m. under constant head supply. A relay control unit of 25 g.p.h. of water is fed with constant head supply 15 ft. above. The rising current floats off coal fines and the finer sand fractions. Washed "grit" sand flows over a 3- x 5-ft. Sherwin screen with No. 7 mesh cloth, for separation of organic matter, and then discharges into a 7-ft. dia. Stokes hydrosizer where final separation is made.

This sizer is of 3/16-in. plate, has a peripheral overflow and a 60-in. sorting column from which the material is discharged through a spigot-controlled ball valve. It is operated by a relay control unit and has two inlets admitting upward current water into a teeter chamber at the rate of 32 g.p.m. fed by a constant head supply.

A scraper, or stirring mechanism, is incorporated and driven by a worm gear.

The final separation extracts the remaining coal and sand fines, and the coarse grit sand, still containing ¼- to 3/16-in. particles, flows over a reciprocating screen to make that separation. The ¼- to 3/16-in. sand discharges into storage bins and the remaining coarse sand is fed into a sump and pumped by a 3-in. Vacseal pump to a 3-ft. 6-in. x 2-ft. 6-in. Prior grit cone for final scrubbing before delivery into bins.

Plus 2¼-in. gravel was rejected at the washer as was the minus 3/16-in. material which is processed into commercial sand. Sizing of gravel into 2¼- to 1½-in., 1½- to ¾-in., and ⅜- to ¾-in. sizes is done over a 3-ft. 6-in. x 32-ft. Corts reciprocating screen, and dropped into separate bins.

Abrasive wear from dropping the gravel into the bins, which are of concrete construction, necessitated a liner to take the wear, and a local brick of the type used in sewer construction has proved effective.

Plus 2¼-in. gravel from the washer, after passage over the clay picking belt, is put through a 20- x 10-in. Broadbent-make primary jaw crusher and through a 4-ft. 6-in. "Pegson" Telsmith cone crusher. Products from crushing are returned over an 18-in. belt conveyor to the main conveyor and are then rewashed and screened.

An additional conveyor is provided which delivers from the feed hopper material from a supplementary sand pit in another part of the site which is fed to enable us to balance the consumer demand such as when operations from the main face are feeding more gravel than sand. It discharges just below the transfer of the reject conveyor on to the main conveyor.

We have alternate arrangements whereby we can divert plus ¾-in. material to the crushers to enable us to meet any heavy demand for all grades from ¾ in. down.

The water supply is from the lagoon which is now some acres in extent, and all storage bins have intricate drainage for either reclaiming water or dispersing by the flumes to settling ponds which slowly restore the land.

The aerial ropeway cars are filled from the processed storage bins, which are 30 ft. high and hopper pitched to a bingate discharge 6 ft. above the ground. There are 23 cars of 1232-lb. filled capacity which discharge into sales hoppers. Finally, the material is weighed over a "Pooley" make 30-ton scale.

Personal contacts around English pits and our own experience has led me to make a challenge to equipment designers with reference to the removal of coal and chalky gravel. Gravels here exist in reserves of 30-ft. depth in the coal areas which are the center of large manufacturing industrial communities.



Aerial ropeway which transports finished material to the sales hoppers visible at lower right. Netting between towers marks point ropeway crosses canal



Slackline cableway in operation

Lignite nodules in the 1½- to 2½-in. size range, coated sand and odd concentrations of coal fines are found in the first 12-ft. level of the face. Certain modern hydrosizing and cones eliminate, at least to something like 1 percent, the coal fines and light fragmentary lignite when these nodules are broken up through crushing. It is a challenge to some designer to study the removal of plus ⅜-in. minus 1½-in. material and to develop equipment for the purpose that will not be a bottleneck to normal production, and to do so without such an interspersing unit arresting or bottlenecking the normal hourly capacity flow.

I referred to chalk. East England has a large percentage of chalks constituent with cherts, flints and the normal type gravels one meets near the coastal reserves. Heavy media separation may possibly be a remedy.

Production Costs

Your editor has asked for costs, and I must also try to present to you some predevelopment legal obligations, haulage costs, sales prices, wages and conditions in Britain.

I am not proposing to be drawn into cost comparisons because costs vary widely between different operators for many reasons and there is no basis for comparison. For instance, we have two pits with high capital plant investment and, since 1945, they have varied as much as from 7 cents per ton to 4.64 cents at present, and these operations are only 2 miles apart. Further, devaluation will give you the wrong impressions as will the living standards here, and the additional restrictive legal conditions, rates, taxes and insurances.

For example, pre-war, the employer here was paying high insurance premiums to take care of his workmen's compensation risks. Now state insurance which covers sickness, accidents and other conditions such as silicosis or industrial ailments has been replaced by direct employer's insurance with a weekly deduction. The cost is borne by employer and employe alike, providing a reserve fund from which employes with working incapacity are

paid weekly. Perhaps I can briefly give you a few running cost values by which to make buying comparisons.

With parity of the dollar to £. sterling at $2.80

Power (from Government)	1¼d. per unit	1.45 cents
Petrol (gasoline)	2/9½d. per gal.	38.86 cents
Diesel	11⅝d. per gal.	13.63 cents
Lube Oil	5/2d. per gal.	85.84 cents
Greases	£3 per 112 lb.	$8.52
750 ft. 4½-in. L. coil wire rope	£162.15s.11d.	$488.02
1100 ft. ⅞-in. L. coil wire rope	£71.7s.0d.	$198.63

Local District Rates: The net annual value assessment at whatever is annually fixed per £1. is arrived at like this:

120,000 x 4d. (or 4.64 cents) derated as an industrial concern by 25 percent x say 15/10d. to the £.
or 4.64 cents divided by 4,multiplied by 120,000 annual output, multiplied by 220.40 cents.

We spend annually around one-sixth of the initial capital value, on say an annual output of 140,000 on plant repairs including labor which is a guide to the size of plant necessary to produce such tonnage.

Labor Costs

Nationally, we have a wage agreement between our trade association and employes union, and below, I present a few figures.

	Basic rate	U. S. equivalent
City and large provincial towns are graded Class 1a	2/3½d.	$31.96
Small provincial towns are graded Class 2	2/3d.	31.30
Rural areas near towns are graded Class 2a	2/2½d.	30.74
Remote rural areas are graded Class 3	2/2d.	29.90

The above basic rates are reviewed usually annually, for changes according to the national cost of living index. When such cost rises above so many points, the basic rates per hour are increased. A scale of differentials is added to the rate and at the moment, we have hardly one man on the low rate. My own opinion is that the less manual work a man does the higher his rate.

These are all minimum rates and most firms pay more with the shortage of skilled quarry employes and, by and large, with output bonuses the men earn about 25 to 30 percent over the rate for the job they do.

Sales

In southern England, sand and gravel is priced by the cubic yard, and trucks are studded on the sides for examination by receiving consumers. In north England, selling is done by weight.

By English law, a weigh note must make legal, weighing declarations. A Government inspector can, at any time, take a truck off the road and put it over a public scale and check. If found to be short weight according to the delivery note, the company receives one warning, and after that, is heavily fined. Our greatest difficulty is loss of water content, spilling en route, which is difficult to allow for when washed products must be dispatched without a reasonable time to drain.

Producers sell either direct or partly through distributors. Two points may be of special interest to you. Few producers operate an auxiliary business at their pits, such as precast concrete, lime-sand mortar, or ready-mixed concrete. The latter is slowly coming in, but neither the public, architects, or engineers are yet educated to it. Moreover, those that are using ready-mixed concrete require test certificates, and something approaching a laboratory is needed. Also, because the plants are not easy to get, I think it will be some time yet before they are widely used. Cement is not easy to obtain, and large central batching on public works contracts is not too extensively used. These modern methods are not exactly taking us by storm.

Prices

Prices at the plant per ton run about as follows in United States currency:

Washed grit sand	83.52 cents
Soft sands	62.64 to 90.48 cents
1½ in. to ⅜ in.	97.44 cents
¾ in. to ⅝ in.	104.40 cents
¼ in. to 3/16 in.	111.36 cents

These prices vary, of course, according to competition or increased costs of operations. No discount is given to large or small buyers. Forty miles is considered an average haul, but a fair average is around 25 miles.

Land Restrictions

My long dissertation must end upon a legal note, because I think we have land development restrictions which do not exist with you.

In 1947 an English-Scottish Act of Parliament, known as the Town and Country Planning Act, was drawn up which, since July, 1948, took away from plants the legal right to sell their land above its existing use value at that date. Further, any new developer either extracting minerals, building, or even changing its use of business or residential premises for some more lucrative use, had such increase assessed by a Government appraiser, and a development charge imposed. In the case of minerals, the wording of the Act is as follows:

"Development Charges may be assessed as a royalty according to the volume of minerals produced from time to time. Minerals are defined as any substances obtained by surface or underground working. If a producer at the 'vesting date' was already, with planning consent (all must receive a 'planning consent' before they develop a property, and restrictive conditions as to restoration, etc. as imposed by an Area Planning Officer) excavating minerals; then for a period of a 3-year moratorium, i.e., July 1, 1951, he is given grace to continue without such charge. After that date, what is virtually a land tax by royalty per ton is levied. The tax in the more wealthy areas varies from 6d. to 1/-. per ton [6.96 to 13.82 cents]."

Owners were allowed, within a prescribed period, compensation for their loss of development rights, for which a sum of £300,000,000 sterling, or $840,000,000, was set aside to pay out all such claimants.

However, producers already operating are to receive the agreed value of their claim at 100 percent value of their claim. As the Government expects the same amount in development charges to final exhaustion, the two will be equal. The law is very complex, and I would have to give far more details in order for you to understand its full importance. There are some 130 odd clauses and statutory regulations.

In conclusion, not having visited your country, I can only end on the note I started with, by inviting you to "mix with us" either by exchange of information through periodical news letters in our journals, or to welcome you here whenever you are able to visit this country.

Establishes New Record

IDEAL CEMENT CO., Denver, Colo., established a new record in 1950 in shipments of cement, which were 13 percent greater than in 1949, according to a recent newspaper report. It has also been reported that the company has been issued a certificate of necessity by the defense production administration, covering production facilities directly related to military and defense needs. The certificate authorizes five-year amortization of 70 percent of the estimated cost.

Installs Dust Collectors

SOUTH DAKOTA STATE CEMENT PLANT, Rapid City, S. D., has now resumed full production after a 2-month general overhaul which included the addition of two Buell stack dust collectors.

Although part of the plant was shut down during the installation, the raw grinding department continued in production. It was stated that the plant has shipped five times as much cement so far this year as it did during the same period in 1950. With the cement on hand and that to be produced the rest of this year, 1,400,000 bbl. are expected to be available during 1951. Daily production is about 4500 bbl. Future plans call for a $40,000 smoke stack for the kiln installed last year.

TENNESSEE LIGHTWEIGHT AGGREGATE PLANT



New operation of Lake City Lightweight Aggregate Corp., Lake City, Tenn., utilizes two 70-ft. rotary kilns and minimum other equipment to produce aggregate from shale

By WALTER B. LENHART

THE NEW LIGHTWEIGHT aggregate plant of the Lake City Lightweight Aggregate Corp., Lake City, Tenn., went into operation early in September, 1950. The plant is located at Briceville about five miles southwest of Lake City. Lake City is about 20 miles north of Knoxville and quite close to Norris dam. The plant is one of the few of its kind to be constructed entirely of new material and to take advantage of modern pulverized coal burning techniques.

Product

The product made by the Lake City Lightweight Aggregate Corp. is an expanded or bloated shale, the particles being cellular. It is marketed under the trade name of La-Lite. Concrete block made from La-Lite are said to weigh 15 percent less than those made from expanded slags and to have good strength, high insulating value, nailability, and other advantages that usually apply to all similar lightweight aggregates. La-Lite is made in rotary kilns and in many ways is identical with lightweight aggregates such as Haydite. Concrete block using a 1:14 mix show strengths of approximately 1050 to 1075 p.s.i. Standard 8 x 8 x 16's made from La-Lite weigh 25 to 26 lb. Absorption of water per cu. ft. of concrete is about 12 to 15 percent. Additional test data appear later in this article.

Adjacent to the plant are several coal mines. Over the years they have accumulated large waste dumps in which the material is slabby in character. This shale is the raw material used for the manufacture of La-Lite aggregate. As will be seen in the analysis of the raw material, there is coal in the shale and this results in remarkably low fuel consumption in the kiln.



George I. Greenup, left, secretary-treasurer of Lake City, and R. L. Parker, superintendent

Raw Material Analysis

The quantitative analysis of raw material is as follows:

	Coal	Rash	Shale
Ratio by weight	1	1.7	14.0
Ratio by volume.....	1	1.3	7.5
Percent by weight...	6	10.1	83.9
Percent by volume.	10.2	13.3	76.5

In some parts of the dumps that supply the raw material, the coal content will go as high as 15 percent. Probably due in a measure to the coal content of the raw feed, and to the efficient pulverized coal-burning equipment, the coal consumed at the kiln is roughly 100 lb. per cu. yd. of La-Lite. Coal in the area sells for $4.50 per ton.

Kilns

There are two 6- x 7- x 70-ft. Vulcan rotary kilns with 6-in. linings of fire brick. One of the kilns, at its feed end and for a length of 3 ft., has been restricted in diameter by a ring of concrete block made of La-Lite. This was done as it was felt the kiln had too much draft. The kiln is now 3 ft. 8 in. in diameter at that end.

The fuel for the kilns is pulverized coal that is ground in a direct-firing Raymond mill. The kilns are provided with Brown indicating and recording pyrometers. The temperature in the kilns is maintained at 2100 deg. F. A higher temperature gives a more expanded material but the operators want to get a final product that weighs 1600 lb. per cu. yd. when the material is crushed to minus ¾ in. (including dust). The kilns have a capacity of 400 cu. yd. per 24 hr.

As will be seen from the accompanying drawing of the plant, the material flow is very simple and consists of a 3- x 9-ft. apron feeder that serves a 15- x 36-in. Austin-Western jaw crusher. This crusher operates at 260 r.p.m. and is V-belt driven by a 40-hp. high-torque motor. The crushed material is belt conveyed to a double-deck 4- x 10-ft. Seco vibrating screen and the oversize chuted back to a set of Austin-Western 40- x 22-in. double-roll crushers that operate at 300 r.p.m. and use a 50-hp. high-torque drive motor. The throughs from the rolls

are returned to the first mentioned conveyor belt by a short return belt and rescreened.

The throughs from the Seco vibrating screen are belt conveyed to the top of the main storage bins where the material can be rescreened by one of two additional vibrating screens. All belts are 24 in. except the short return belt from the rolls; it is an 18-in. unit. There is bin capacity for 300 tons of expanded shale and for 510 tons of raw shale.

Operating Cycle

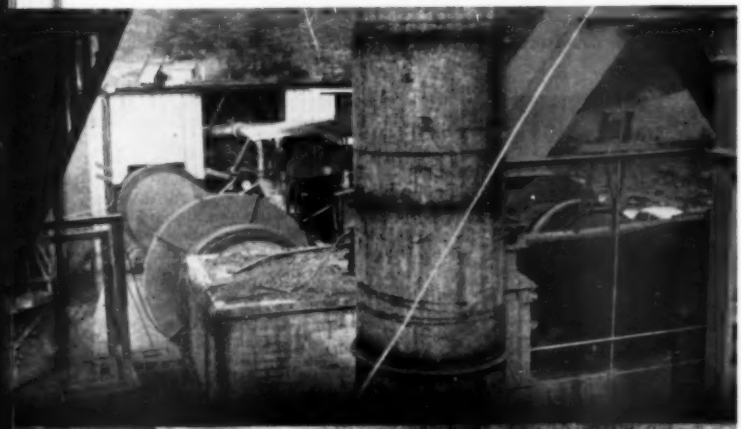
Operation is as follows: the crushing and screening assembly is run as described above until the raw shale bins are full. The shale is crushed and all screened through 1½-in. openings. The raw shale is drawn from the bottom of these bins to a flat running 24-in. belt that serves an open bucket elevator. The elevator unloads to a steel hopper which in turn feeds two small Link-Belt apron feeders—one feeder for each kiln. The apron feeders are served via a "pant-leg," or inverted "Y" chute. The plant operates without cover except for a small structure over the hot end of the kiln.

The clinker from the Vulcan kilns falls to an open concrete pit and a ¾-cu. yd. Insley diesel-driven clamshell recovers the expanded material from the pit into small storage piles near the rim of the pit. The rate and character of the cooling of the clinker have an effect on the color of the La-Lite; by slow cooling a reddish aggregate can be obtained. However, the normal color of La-Lite is a light black. The concrete masonry units it makes are even-textured block that can be easily painted, and the character of the aggregate is such that the paint covers the surface of the block well when standard portland cement paints are used.

All calcined material, after cooling somewhat, is picked up by the clamshell and loaded to trucks which deliver the material to the truck hopper. Under this is the apron feeder assembly previously mentioned. All material is crushed and screened through a ⅜-in. screen and is marketed in that size. Thus the crushing and screening plant serves both the raw and the finish end.



Direct firing pulverized coal mill feeds both kilns





Screening Analysis

At the start of operations La-Lite was screened through a ⅝-in. screen and gave the following screen test:

Passing ⅜-in. sieve	93.1 percent
Passing No. 4 sieve	57.0 percent
Passing No. 8 sieve	34.5 percent
Passing No. 16 sieve	19.9 percent
Passing No. 30 sieve	11.0 percent
Passing No. 50 sieve	5.8 percent
Passing No. 100 sieve	3.0 percent

This type of material weighed 57.6 lb. per cu. ft. and had a specific gravity (bulk, saturated surface dry) of 1.79.

With all La-Lite crushed and screened through a ⅜-in. screen, the analysis is as follows:

Passing ⅜ in. sieve	100 percent
Passing No. 4 sieve	70 percent
Passing No. 8 sieve	46 percent
Passing No. 16 sieve	25 percent
Passing No. 30 sieve	16 percent
Passing No. 50 sieve	7 percent
Passing No. 100 sieve	3 percent

This is only one sample analysis. Screen percentages can be changed by altering crushing so as to meet any specifications.

The following tests indicate the tensile strengths of La-Lite concrete as compared to other lightweight aggregate concretes.

Material	7-day strength (p.s.i.)	28-day strength (p.s.i.)
La-Lite	70	130
Expanded slag	64	80
Cinder	55	103

Above: The two kilns are 6 x 7 x 70 ft. with 6-in. linings of fire brick

Below: An apron feeder is used to feed each kiln; chute at left carries material from bucket elevator



Throughs from the screen are carried by the conveyor (right) to the feed bins

Top: The 15- x 36-in. primary jaw crusher (center) is fed by a 3- x 9-ft. apron feeder at truck bin

Center: Oversize from this 4- x 10-ft. screen is crushed in the 40- x 22-in. double-roll crusher at left, then joins the throughs on the conveyor at right for kiln charging

Bottom: Kilns are driven through gear reducers, seen at left center







Mortar strength tests on concrete of La-Lite, expanded slag and cinders were as follows:

Test Colorimetric Mortar strength test graded to Ottawa	La-Lite Plate No. 1		Expanded slag Plate No. 1		Cinders Plate No. 2	
	7 day	28 day	7 day	28 day	7 day	28 day
	3848	8368	2419	4193	3074	4723
	3571	8153	2368	4050	3113	5058
	3946	8134	2230	4395	3278	5465
Average	3788	8218	2339	4213	3155	5082

For loading the crude shale at the source of supply, a 1-cu. yd. Insley shovel is used. For handling coal or other material around the plant an Allis-Chalmers front-end loader is available. The company operates three trucks at the plant.

The finished La-Lite in the storage bins is reclaimed by a horizontal belt conveyor under the bins which serves an Atlas portable inclined belt conveyor, with which cars or trucks can be loaded.

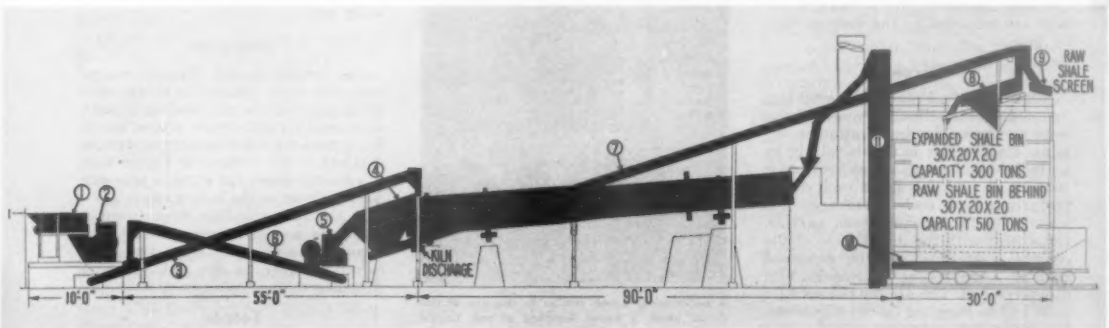
The plant is compactly arranged and neat in appearance. It was built by the company, though the general design work was performed by John Hays.

The office of the Lake City Lightweight Aggregate Corp. is in Lake City, Tenn. A. G. Greenup is president, Tom Mineo is vice-president, and George I. Greenup is secretary-treasurer. L. V. Shelley is chairman of the board and R. L. Parker is superintendent. The plant is near the Southern Railroad. The company owns a 1200-ft. railroad siding.

National Gypsum Report

NATIONAL GYPSUM CO., Buffalo, N. Y., announced in its annual stockholders' report that the company's earnings and sales in 1950 were the highest in its 25-year history. It was also disclosed that the company appropriated $12,633,000 in 1950 for plant improvements and expansion.

In discussing current business conditions, it was stated that a substantial backlog of unshipped orders was carried over into 1951 and, at the present time, all principal products are being allocated. It is expected that credit restrictions on mortgages and allocation of materials will be offset by increased demand for low-cost housing, growing needs for repairs, modernization of existing dwellings and more industrial construction.



Material flow through plant of Lake City Lightweight Aggregate Corp. Numbers identify the following: (1) apron feeder, (2) 15- x 36-in. primary jaw crusher, (3) raw material conveyor, (4) 4- x 10-ft. screen (5) secondary 40- x 22-in. double-roll crusher (6) return conveyor (7) bin conveyor, (8) (9) raw shale screens, (10) flat running belt conveyor, (11) bucket elevator

MEDUSA'S CURRENT EXPANSION PROGRAM

Toledo plant being converted to dry process, new products added at Bay Bridge, efficiency and capacity being stepped up at other mills

By BROR NORDBERG

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, with mills located at Bay Bridge, Ohio; Silica (Toledo), Ohio; Dixon, Ill.; York, Penn. (2 units, white and gray); Wampum, Penn.; and Manitowoc, Wis., has recently completed or has underway a building program at all the mills. The company has granted us permission to summarize the respective programs in the following.

Bay Bridge

The main item of construction at the Bay Bridge mill has been a plant for the production of BrikseT and Medco. This plant has required a new building which is constructed adjacent to the existing finish grinding department. One of the 5- x 22-ft. tube mills in the finish grinding department has been equipped with a 12-ft. dia. Raymond air separator, and is used for the production of these two products. Space has been left for the addition of a second tube mill and separator, should the volume of shipments require it.

The stone required for the manufacture of BrikseT is prepared in a No. 6669 high-side Raymond roller mill. This mill, with the separator, exhauster and oil-fired furnace, all of which comprise an entire unit, dries and grinds the limestone. The conveying and elevating equipment for the stone are designed for delivery of material either by truck or by railroad car. Provision also is made for the handling of gypsum which is required for the two products. The cement required at this plant is returned from the storage silos by a Fuller-Kinyon transport system. The finished products are returned to the storage silos by pump.

Dixon

Six 4- x 18-ft. Fuller air-quenching, inclined grate clinker coolers have been purchased for installation on the kilns. Each cooler is furnished air by an individual blower. A drag conveyor running lengthwise under each cooler transports both cooler discharge and leakage to the existing peck carrier. Coincident with the installation of the coolers, each kiln will be equipped with an Allis-Chalmers air-cooled kiln discharge end. The air for the six kiln ends will be supplied by one blower selected for that purpose.

Two of the kilns have been equipped with new driving mechanisms comprising a wound-rotor type of motor and gear reduction unit in addition to one set of open-cut gears and the existing main pinions and girth gears. By means of a tachometer generator mounted directly on the kiln drive motor, the speed of the kiln feeder is coordinated with the kiln speed through a Thy-mo-trol unit. The tachometer generator also actuates a recording indicator at the burner platform to give a continuous record of the kilns' rotation. Similar equipment has been purchased for the remaining four kilns to be installed at the same time that the Fuller coolers are installed.

York

In the white cement plant a Babcock & Wilcox three-drum type vertical-tube boiler is being installed on the No. 3 kiln. At the present time, the gases from all three kilns are discharging into one boiler, but with the new boiler, kilns 1 and 2 will serve the existing boiler and No. 3 kiln will serve only the new boiler. To take care of the increased boiler water requirements a new Cochrane de-aerating feeder and auxiliary boiler feed water pump are being installed. New rotating elements also are being installed in the existing turbine-driven pump which will increase its capacity to the required amount. The kiln and boiler will be equipped with a Sturtevant draft fan which will discharge the waste gases to the existing Buell dust collecting system.



A pulverizing system similar to this one at the Dixon plant is being installed at the Toledo plant. Rejects from air separator drop through vertical pipe into pulverizer; fines drop down inclined pipe to air activator conveyor which also receives fines from overhead dust collector

The No. 3 kiln is also being equipped with a 4-disc Oliver United slurry filter. Heretofore it has operated on slurry.

Both the gray and the white plant are furnished power from one common powerhouse. Here a new 4000-kw. Westinghouse turbine-generator is being installed to supersede the present two 1500-kw. machines. The new turbine is equipped with a Westinghouse surface condenser and condenser auxiliaries. The electrical switchgear and control equipment for the new generator mill be coordinated with the controls for the existing units.

For the cooling of the condenser circulating water, a Foster-Wheeler two-cell cooling tower is being installed. This item will replace the existing spray pond.

At the gray plant the Cottrell electrical precipitator, after many years of service, is being replaced by a new Cottrell unit.

Many changes are being made in the plant for the production of cement paint, tile grout, and other specialties. When these changes are completed the operations which are now divided between Bay Bridge and York all will be consolidated at the York plant. A warehouse building for the storage of cement specialties, raw materials and containers has been completed and is being used.

Wampum

The weighing and loading equipment for bulk cement is being relocated to facilitate the loading of both cars and trucks. Some alteration is being made in the transport system so that any or all of the four Fuller-Kinyon pumps under the storage silos can deliver direct to the bulk station.

In the raw grinding department a Hum-mer screen is being installed to remove fine material from the stone before it goes to the raw-grinding Hercules mills.

Toledo

This plant is being converted to dry process. The main grinding units are two B & W pulverizers with stoker-

fired furnaces, Sturtevant mechanical air separators, and mechanical dust collector equipment. It is planned that the existing slurry tanks will be altered and equipped with porous blocks in the bottom and other equipment to adapt them for air agitation and homogenizing of the dry raw mix. A group of four 20-ft. dia. x 100-ft. high concrete silos will be constructed for use as blending and storage tanks. A circulating system using elevators and conveyors will be installed for handling the kiln feed.

In the crushing department, a Pennsylvania impactor is being installed to operate in closed circuit with vibrating screens to produce a minus ½-in. product for feed to the B & W mills.

In the kiln department, new drive mechanisms with direct-current motors operating from motor generator sets are being installed. The drive arrangements include a synchronous tie system to coordinate the kiln feeders with the kilns.

In the finish grind department two Bradley Hercules mills are being installed to take care of the increased kiln production which is anticipated. Another 7- x 22-ft. tube mill is being installed which will make a total of three 7- x 22-ft. tube mills. Each mill will be equipped with a Raymond mechanical air separator to operate in closed circuit as a unit. The transfer of the finished cement to the storage silos will be by Type "H" Fuller-Kinyon pump and transport system.

The existing hand-fired auxiliary boilers are being removed. To replace this power capacity, a transformer and line to outside power is being installed. Switchgear required by the increased power capacity is being installed, together with unit substations for plant distribution and general revisions to the electrical system.

Manitowoc

The capacity of the Manitowoc plant is to be increased by the addition of a fourth kiln. This increased production requires additional equipment in the raw and finish departments also.

In the raw grinding department, a third No. 85 Smidth Kominuter is being installed. Each of the three Kominuters will be equipped with two Tyler Ty-Rock screens to operate in closed circuit. A third 7- x 22-ft. tube mill also is being added in the raw department.

The new Allis-Chalmers kiln is 10 x 340 ft. The drive is by direct-current motor with a synchronous tie to coordinate the kiln and the ferris wheel feeder. The kiln will be furnished with a chain section to operate on slurry feed. The clinker cooler for this kiln is an Allis-Chalmers 4-ft. 6-in. x 70-in. grate-type cooler.

The coal for the additional kiln will be handled through the present coal handling equipment to the kiln bin. A Raymond bowl mill will grind the coal for the kiln operation.

In the finish grind department, a third Bradley Hercules mill is being added, as is a third 7- x 22-ft. tube mill. Each tube mill will be equipped with a Raymond mechanical air separator and elevating and conveying equipment, each mill and separator operating as a unit.

A Buell precipitator is being installed for the three existing kilns to follow the present cyclone collectors. The new kiln will be equipped with a separate Buell cyclone and precipitator collection unit. The waste gases from all four kilns will discharge to a new 14- x 300-ft. concrete brick-lined stack.

A stone preparing mill similar to that used at Bay Bridge and a 5- x 22-ft. tube mill are being installed for the production of BrikseT and Medco.

In conjunction with the above changes, connection to outside power is being augmented through the installation of larger transformers. Within the plant, unit substations will be used for power distribution with the electrical system being generally revised.

M-4 Order Amended Again

THE NATIONAL PRODUCTION AUTHORITY has again amended the M-4 order on construction, imposing drastic restrictions on building and construction. Order M-4 prohibits the commencement of construction of certain types of buildings, structures and projects, unless specific exception is made, or authorization is issued by N.P.A. The order allows, within specified limits, small construction jobs and necessary maintenance and repair of buildings, structures or projects, and also permits, under specified circumstances, the restoration of these, in the event of a disaster.

The most important change is in Section 17, List C. It pertains to additional construction when N.P.A. authorization is required. It lists the following:

1. Multiunit residential building in excess of three stories and basement.
2. Residential unit for single-family occupancy where the construction costs exceed $35,000.
3. Building, structure, or project for radio broadcasting or television broadcasting.
4. Terminal warehouse.
5. Any and all other public or private buildings, structures, or projects of a type not listed above, and not listed in List A, or in List B, of every kind (including but not limited to an industrial plant, facility, or factory), which will require the use of more than a total quantity of 25 tons of steel, both in the forms and shapes as defined in N.P.A. Order M-1 and also reinforcing steel.

There has been a revised definition of "commence construction." This is a more liberal approach to determination of the "cut-off" point for construction which is either prohibited or brought under control for the first time. It now reads as follows: "Commence construction" means substantial site clearance (including demolition of building or structures), preliminary to the start of, or incident to, the work on a new building, structure, or project; or to incorporate into a building, structure, or project, substantial quantities of materials which are to be an integral and permanent part of such building, structure, or project."

Another principal change in the amended order is the revised definition of construction. It now reads as follows: "Construction cost means the total expense for demolition of existing structures in connection with a new construction, for site preparation, and for building materials, building equipment, labor and services used in the construction of the particular building, structure or project, by whomever spent. It does not include the cost of personal property, or the expense for land acquisition, attorneys, architects and financing."

Another limitation is under Section 4—"Prohibited Construction." It states that after midnight, January 13, 1951, with respect to construction specified in List B, and after midnight, May 3, 1951, with respect to construction specified in List C, no person shall commence construction of any building, structure or project to be used for, or in connection with, any of the purposes specified, as set forth in those lists, until a specific authorization has been issued by N.P.A. However, in matters involving unreasonable hardship, or when required in the interest of national defense, an exception from the order may be granted. Other exemptions pertain to small jobs of new construction and to alterations, additions, improvements and modernization. For any such construction or alterations, as specified in lists A, B and C, an amount up to $5000 for any consecutive 12-month period may be permitted. (In computing this cost, only construction cost shall be considered.) Another exemption is reconstruction of a building, structure or project, following a fire or other disaster, which occurred on or after July 29, 1950—provided, however, that the reconstruction work will not require the use of more than a total quantity of 25 tons of steel, including reinforcing steel.

Applications for "authorization for certain construction," or for "adjustment or exception," must be made on N.P.A. Form NPAF-24, copies of which are available at all field offices of the Department of Commerce, and which should be addressed to the field office in the region of the site of the proposed construction.



Long belt conveyor discharging to screen and rotary washer

Operation of Long Belt Conveyors

Ideas of production men and both good and bad experiences with conveyors summarized as a result of personal interviews and inspection on the job

By WALTER B. LENHART

IN THE FOLLOWING data we are not going to discuss belt conveyor design nor any of the theories and mathematical formulae relating to long belt conveyors. However, we will touch on a few of the unexpected things that have happened to such installations. In other words, we hope to give a resumé of incidents, accidents and factual data that we have accumulated in over a year's continuous travel, during which time we visited many new and old long belt conveyor installations. Our observations were not confined strictly to the rock products industries. Whenever we heard of a long belt installation that was within reasonable distance of our itinerary we took a look at it. Usually this resulted in at least one idea that does not appear in handbooks on belt conveyors or in sales literature.

The men who operate the belt conveyors furnished most of the information. These data are directed to those who contemplate installing long belts, with the hope of eliminating unnecessary trouble.

No one ever has defined a long belt installation. These installations fall into two groups: the first group is those conveyors made up of a series of separate flights, so that the assembly may be several miles long. The second group might include installations made up of one single belt and could be from a few hundred feet to two miles, center to center, in length. Most of the data which follow could apply to both groups, and we are not attempting to limit, by any definite figure, the definition of just how long a belt must be to be a "long belt."

In perusing the accumulation of literature on belt conveyors, no one appears to have discussed the "small boy" hazard. This is a real problem, especially if the long belt is installed near communities. As an illustration of what we mean by the "small boy" hazard, we have in mind one operation that had a belt roughly 2000 ft. long. One Monday morning the belt would not start when power was applied. The mechanism groaned, belts slipped, but the conveyor would not move. Investigation revealed that some small boys (presumably) had tied a rope around the center of the belt and had connected it to a telephone pole. The remedy here is to have two men, one starting from each end of the belt, patrol the belt end to end, each morning before it is started, each man inspecting his half of the installation.

When we told this episode to another long belt operator he said, in effect, "We never have run into that particular situation but we often have found such objects as tin cans, bottles and other rubbish placed on the belt." He then recalled how a 125-gal. water boiler had been placed on the belt "for the ride," but was not caught until it showed up on the bottom of the surge pile.

If a long belt runs under a road or highway, experienced operators advise that a wire fence be installed to keep out tourists. Where no adequate fence is provided, drivers have been known to stop and unload garbage onto the traveling belt.

Many so-called long belts, especially in the rock products industries, are field belts. In such installations the overall length of the belt is continually being changed. The technique consists of adding a segment, usually a 22-ft. section, at the more distant loading end. Very often when an installation has reached a maximum length, retreat operations begin. This means



A pendulum conveyor is used to feed this 36-in. field conveyor

that a section of belt must be removed, rolled up and stored. With this preliminary outline in mind, we asked one large field belt operator what the most important advance in belt conveyor material handling had been. He made this rather surprising answer: "The most important advance has been to incorporate into the belt itself an anti-mildew chemical. Now it is possible to roll up a wet belt. It does not sweat, nor does it heat or rot in storage."

One of the first long belt installations was used to convey aggregate for Shasta dam on the upper Sacramento river. The installation was made during the late 1930's. During that time the series of belts handled roughly 12,000,000 tons of sand and gravel. When construction ended the assembly was sold and sections of the belt and conveyors are now scattered all over the world. We found one enterprising belt user who had purchased a sizeable amount of belting from that installation. The belt was too wide for his plant, so he cut it into widths suitable for his work. But the belt was still too thick and had too many plies, so he devised a splitter which enabled him to get two 18-in. wide belts from a single 18-in. strip of the Shasta belt. He said, "It was the best buy I ever made in my life." We refer to this observation because it indicated that the salvage value of a belt may be higher than ordinarily assumed. Incidentally, the Shasta installation was approximately ten miles long and consisted of a series of conveyor sections, the length of each being governed by the horsepower required to operate it. In this case no section used over 200 hp., and since the belt crossed rolling country, the lengths varied. This same practice seems to have been followed by many more recent long belt installations. At one operation the practice is to use two 100-hp. motors, V-belt driven, in those sections where the horsepower is at a maximum (200 hp.). We think that this idea is worthy of thought by those considering belt conveyors of the type reviewed here.

Alignment

At one installation, there seems to have been a difficulty in the "cupping" of the belt. All conveyor belts should be supple and pliable enough to ride the troughing rack smoothly, in order to distribute the load evenly. When the belt is on the flat return rollers it should adjust itself and lie flat. In this particular installation, "cupping" on the carrier rolls was such that most of the load was carried by the center roll. Upon examining the troughing rolls one could easily see that the center idler was polished brightly, whereas the two outboard carrier rolls were rusted. (see drawing).

When this same belt went back on the flat return roll it rode on its two outer edges (shown in drawing). In this instance, the outer ends of the carrier rolls were polished and the central area badly rusted. The polished areas carried the weight, therefore absorbing more than their share of the wear. The edges of the belt will undoubtedly wear out long before the main section, so it is evident that cupping can decrease the expected life of a conveyor belt quite materially. The cupping of this belt also made it necessary to lower all the return rolls about 6 in. to make room for the proper belt travel.

In cold weather, belts can normally be expected to retain any cupped characteristics longer than similar belts in a hot climate. However, in either case, when cupping occurs passage of the belt over the head, tail or drive assembly pulleys does not correct the condition. At least this was found to be true of the belt described above.

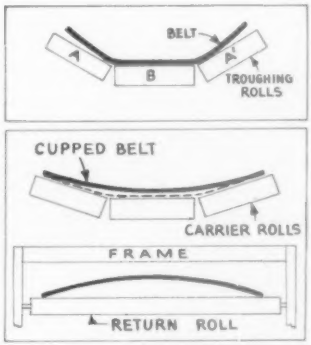
On long belt installations some operators used a relatively short take-up because the belt was assumed to have a low stretch factor; on other installations a longer take-up was used. It was observed that where a long, vertical take-up was used it became necessary, after operations had started, to enclose the vertical section as protection from the wind. The wind would catch the vertical belts, twist them and cause them to run off the pulleys with resulting edge damage. If short take-ups are used this problem is less serious, although still evident to a degree.

Another operator erected a partition between the up-moving and the down-moving belts on his long vertical take-up to diminish wind damage. The same company plans eventually to enclose the entire take-up assembly.

Splicing

In various belt conveyor handbooks there are several pages on splicing and some such statement is included: "Vulcanized splices are stronger and last longer . . ." This is a controversial subject about which there are many pros and cons as there is on any method of splicing a conveyor belt. However, in our travels, we noticed that where a vulcanized splice went through, around and over a rather complicated drive assembly, there was a constant strain imposed on the splice. In one segment of the arc the splice is inclined to open up; in another arc, compression of the splice takes place and if a failure occurs it usually starts to open from this cause.

In some cases where vulcanized splices were used, extreme dissatisfaction was indicated, while in about an equal number of cases pleasure was expressed. In reviewing the matter, two generalizations developed. First, that success depends on the job of splicing itself. Secondly, that if the company which supplied the belt also did the splicing, results were always successful, while if a vulcanizing shop did the work, results were not always satisfactory. From these observations it seems evident that a reliable belt manufacturer can do a vulcanizing job with better results than local custom shops.



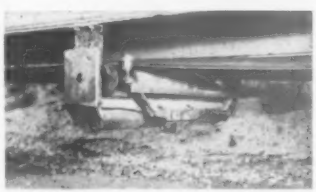
Examples of improper running belts. Top: A and A' were rusty, B bright, indicating it was carrying all the load. Bottom: Cupped belt, which contacts edges of return rolls

Protection

It has been suggested that belts be spliced at a 45 deg. angle, as a means of getting more metal splices per inch of belt width, thereby giving more strength at the splice. However, we saw no belts spliced in this manner.

The question of whether to cover a belt or not is an important subject. In the southwest, where dry, hot days are the rule, most of the belts observed were uncovered. However, at one extensive installation some of the belts had begun to pattern-crack or check after only a few months of operation.





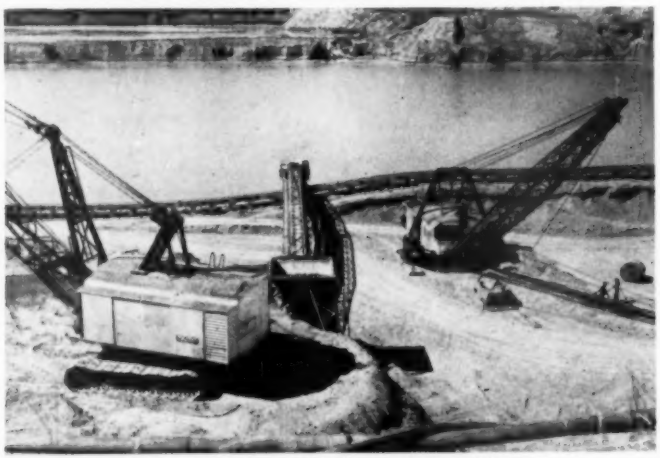
Top: A simple device to keep a belt running true. Bottom: Another type of self-aligner, this one on the return side of a long belt



Excess sand and clay is removed by spirals (center) before the rock is sent to the main plant 1½ miles away on this conveyor, made up of a number of sections



This is what happens when the brake mechanism on an inclined belt fails. The large sized material had previously bounced off before the belt sagged as at the left



The belt conveyor here clearly follows the contour of the shore

Possibly this was accelerated by the effect of the hot sun on the rubber. We do not know the temperature of the rubber in the sun but where ambient temperatures are as high as 110-120 deg. F. it is likely that the surface of the belt might get as hot as 150-160 deg. F. If the belt is not the right type to withstand the severe heat it will not reach its expected life.

Belt Sizes

There was a widely expressed opinion that manufacturers of belts and belt conveyor assemblies limited sizes and strengths too much. It was pointed out that this was partly the fault of the buyer who wanted as inexpensive a first cost as was compatible with reasonable operating practice. In order to meet a competitive situation, all manufacturers did not require sufficient safety factors. One user of long belts said, "If all manufacturers would add at least 4 in. to the radius of all head, tail and drive pulleys, and at least one ply to all belts, we users would have far less trouble."

Protective Devices

This weakness or lack of strength in design was particularly noticeable on the brake mechanisms that are usually at the head pulley. Probably 50 percent of the brakes did not hold, so the original brake had been replaced by larger units, or else the user had made his own brake, usually a ratchet device. In a few instances, where the brake did hold, the main bearings on the head pulley shaft did not. In these cases, failure was due to the cap breaking, or to the cap bolts not going entirely through the bearing and through the steel foundation plate supporting the assembly. In any event, it was pointed out, head brakes must act instantly and not after the loaded belt has started downhill.

Where large rock is to be carried on an inclined belt, one can take a lesson from the stacker belts on some of the Western gold dredges. On these dredges all gravel that gets into the dredge proper must go out via a stacker belt that is usually inclined. Over the stacker belt, spaced at 40-50 ft. intervals are hinged "fingers." The donnikers can go up and under these fingers, but if a rock starts to roll back it can only roll to a group of fingers, since the hinge is a one-way device; it lets the gravel go up but stops it from rolling back. When a piece of large gravel comes back to these fingers, the rock becomes stabilized, so to speak, and is discharged over the head pulley to the waste piles.

At a gravel handling operation involving a surge pile, the large gravel was being crushed to minus 8 in. before being elevated on the stacker belt. A roadway is under the central portion of the stacker belt. While we were inspecting the installation the drive motor stopped for some reason,

and the brake did not hold. When the brake failed, the loaded belt reversed itself and, at once, considerable slack appeared in the belt carrying the 8-in. gravel. As the belt slid down the hill, the slack belt and the carrier idlers combined to make a bumpy ride for the material on the belt. The result was that all the large gravel bounced off the belt, fell around on the walkway and literally rained 4- to 8-in. pieces to the road area below. If a car had been in the vicinity, no doubt the occupants would have been seriously injured or killed. It is evident from this incident that it is unwise to build a roadway under an inclined belt conveyor unless adequate safety precautions are exercised.

In some of the older belt conveyor installations, wood supports for the carrier and return rolls are used extensively. We considered this type of installation to be out of date, technologically speaking, since we had seen so many assemblies using steel frames and supports that gave the operation a modern touch. However, at a desert installation a flat-running belt was in use. It was roughly 1700 ft. center to center and was on steel legs, neatly assembled on concrete piers. The frame was also of steel construction. Here the belt was running, for practical purposes, east and west. Because of the plant's location with respect to latitude, the morning sun hit the tail end at an angle, expanding that side and end of the conveyor frame during the early morning hours. As the sun advanced across the sky other sections of the steel framework expanded. The result was a continual misalignment of the belt due to unequal expansion of the framework. The corrective seems obvious; self-aligning carrier and return rolls, plus possible slackening off of a connecting end-plate at certain spots.

When we asked the operator of this belt how many self-aligning carrier and return rolls he used, he said, "Not enough." This seems to be a rather universal situation in most conveyor installations. However, this operator was remedying the situation by installing, as fast as possible, self-aligning carrier and return rolls.

One operator who had had wide experience with belts over 2000 ft. long said that it is essential for a long belt to ride the tail pulley. He uses three self-aligning flat rolls just ahead of the end pulley, one quite close to the pulley and the other two spotted on 20-ft. centers behind the first. On a 2300-ft. flat-running belt he had a total of 12 aligners on the return belt and six on the troughing rolls.

Uncovered flat running belts, when not in use, are excellent collectors of rain water. If there is a sag anywhere in the belt between the head and tail pulleys, rain water will collect and stay in this pocket. We observed many belts, when the plants were not operating, being propped up with sticks so that rain water would not accumulate. This could be a serious problem, especially as a belt gets older and the top coat becomes torn or cut, thus allowing water to get into the fabric and rot it. A gentle slope to the tail end of a belt along with adequate tension on the conveyor may alleviate this problem.

Accidents to belts cause more damage than conventional wear. Therefore, where a long belt is contemplated to offbear direct from a crusher, a short offbearing belt has been suggested that would take the material from the crusher and deliver it to the long belt. Thus, if a bar slipped through the crusher's jaws and pinned itself to the offbearing belt, only a small belt would be damaged. It was observed that chutes at transfer points were of such design that if a bar was enroute to a belt it would go onto the offbearing belt, thereby lessening the chances of damage.

Belt Life

We have not attempted to go into the subject of conveyor belt life, since each belt is a separate and distinct problem. However, we did notice that one gravel operator used all woven fabric belts. A 36-in., 42-oz., 6-ply belt handled 10,000,000 tons on one field belt, 6,000,000 tons on another and is still in service. This operator had belts, five miles center to center, in use with some sections almost 1200 ft. long. He used metal splices, and the belts were interlocked using 200-hp. slip-ring motors. The drive pulleys were all lagged with "rough top" attached to the head pulley with flat-head elevator bolts.

From other sources we learn that there are belt conveyors that have carried 40,000,000 tons of coal for 27,000 hr. over a 13-year period, with a breakdown time of 27 hr. It has been said that the life expectancy of a belt conveyor ranges from five to 15 years.



An example of a long belt take-up



Close-up of typical drive and motor

By far the most important factor for longevity of a belt is the skill of its user both from an installation and an operating standpoint.

We looked into the subject of lubrication of carrier and return rolls, head and tail assemblies, etc., and there seem to be as many ways and types of lubricants as there are belts. About the only generalization that can be made is that on the more successful installations, regular and periodic inspections are made and lubricating is done according to a definite schedule. One operator of a long inclined belt had installed permanently greased carrier and return rolls and was so confident of their success that he did not build the usual walkway alongside the belt. This may be good practice but it seems that a belt conveyor should be regularly and carefully inspected and that all reasonable care should be taken to facilitate a good inspection job. One operator lubricates his carrier and return rolls every six months, using a medium-heavy stock, solidified base cup grease.

Most of the belts were operating in the 400 to 500 f.p.m. range. One 48-in. inclined belt was operating at slower speed but carried an "edge to edge" load that was heaped up unusually high. One ribbed belt was operating at 890 f.p.m., but at this operation most of the belts were running 600 f.p.m. A tripper belt and a pendulum or "boom" belt were operating at 500 f.p.m. Sequence starting seemed to be successful in all cases.

In the belt conveyor installations inspected the longest belt was one about 2500 ft. long, but in the coal industry a steel cable compass belt, single flight unit is in operation that is 10,900 ft., center to center, or a little over two miles long.

In Ohio a system of belt conveyors is contemplated that will be over 100 miles long, and will carry coal and ore in one direction and a return payload as well. At this writing the Ohio legislature has refused permission to obtain land for the conveyor right-of-way.

Test Data

If one is interested in data relating to test work on long conveyor belts we refer to two papers on the subject. These reports relate to tests for River-



Long belt conveyor sections feeding to stockpiles

lake Belt Conveyor Lines, Inc. Part I is by A. W. Lemmon, manager, Research and Development, Products Division, The Jeffrey Manufacturing Co., Columbus, Ohio. Part II is by A. D. Sinden, Stephens-Adamson Manufacturing Co., Aurora, Ill. The papers were presented at the third biennial Materials Handling Conference, sponsored by Westinghouse Electric Corp. at Buffalo, N. Y., in October, 1950.

The papers contain extensive data, including charts which show the relative movement of the belt at the head and tail end in starting and stopping under load. The studies are thorough and leave little room for argument. Obviously, it is reported, when the head end of a belt is moving and the tail end is stationary, the belt must be stretching. Therefore, the problem of reducing lag is equivalent to finding a solution for keeping down stretch. It is pointed out that total belt stretch is proportional to the length of the belt, so the lag could be reduced by dividing the conveyor into smaller units. Another approach that seems to offer encouragement is to find a way of keeping starting tension in the belt to a minimum. On this subject, Mr. Sinden made the following comments:

"There are two main causes of extra belt tension in starting a conveyor. One is the higher value of static friction over running friction. The other is the inertia of the load on the belt and all the moving parts of the conveyor. Since most of the friction in a high-grade belt conveyor is of the rolling type, there is only a relatively small percentage of frictional resistance in starting over that for running. Even the slight difference that does exist between friction coefficients in starting and running would not apply in full force in a belt conveyor. The reason is that, with any stretch at all in the belt, the carriers start to move in sequence like a locomotive starting a freight train, after first backing to accumulate slack in each coupling. Hence, in a typical belt conveyor, most of the extra starting tension is used to overcome inertia of the moving elements.

"To get a general idea of the magnitude of the forces with which we are dealing, let us examine the data for one of the conveyors tested. The conveyor in the tests was a 48-in. conveyor, 1327-ft. long, with a rise of 44 ft. It had a belt speed of 565 f.p.m. and carried 2200 t.p.h. of dirt and stone. Per foot of conveyor there were 130 lb. of material and 60 lb. of belting, pulley rims, etc. A total of 250,000 lb. had to be put in motion when the conveyor was starting up. Supposing the acceleration to be uniform at 1 ft./sec./sec., it would take 9½ sec. to bring the belt up to the full speed of 9½ f.p.s. (or 565 f.p.m.). The force needed to accelerate 250,000 lb. at 1 ft./sec./sec. is about 8000 lb. The belt, being six-ply, has a unit stress of 28 lb. per inch-ply resulting from the accelerating force of 8000 lb. Allowing a working stress of 60 lb. per inch-ply for the 48-oz. fabric which comprised the belt carcass, our extra starting stress of 28 lb. per inch-ply amounts to 47 percent of working stress.

"This means that if the conveyor is started fully loaded in about 10 sec. at uniform acceleration, the belt is stressed to about 150 percent of normal working stress. According to advice from the belting manufacturers, this much overload is a little more than is expected and allowed for in designing a belt and predicting its service life."

From this and other data it becomes apparent that the stretching of the belt eases the impact of the acceleration peak.

Another paper delivered at the same conference was by Harold Von Thaden, vice-president and general manager, Robins Engineers Division of Hewitt-Robins Inc., New York, N. Y. This paper, entitled "Conveyors and The Problem of Military Supply," contains relevant technical data as well as an outline of how belt conveyors could be used to deliver supplies to front line areas. Mr. Von Thaden states that a ¼-mile belt conveyor can be laid in two hours by a team of 35 men, and that 10 miles of straight line conveyors will do a job where 15 miles of road might be required on the average.

Any of these papers are available through Westinghouse Technical Press Service, Pittsburgh, Penn.

We have also found that belt conveyors may be used as a rapid means of moving large numbers of people from congested areas. In the years ahead long belt conveyors may become more common, since they do offer efficient means of transportation at low costs.

During our travels we learned of a large construction job involving the handling of 5 to 6 million cu. yd. of sand and gravel on a haul about six miles long. A study was made of rail, truck and belt conveyor transportation, and the builders decided upon railroad haulage. We have often wondered why belt conveying, the cheapest method for transporting such quantities, was not used, and have wondered if the engineers in charge had as much difficulty in obtaining a handbook on conveyor belts as we had. At the outset of our plan to visit long belt installations we contacted, in one city, five regional offices of large belt manufacturers before we were able to get one handbook.

If the builders of the 6,000,000-cu. yd. concrete dam had similar experiences, we know of one reason why belts were not used.

Rotary Lime Kiln

NATIONAL GYPSUM Co., Buffalo, N. Y., is installing a 300-ft. rotary kiln at its plant at Buffalo Run. It will be placed parallel to the present kilns which are 400 and 425 ft. in length. The installation, including all auxiliary equipment, cooler, storage facilities for raw materials and provisions for handling the lime after it is burned, will cost approximately $1,000,000.

EVALUATION AND DEVELOPMENT OF KILN EFFICIENCIES

Part III. Sectioning of kilns by use of quadrants, a method to increase kiln efficiency considerably

By VICTOR J. AZBE*

IT IS GENERALLY acknowledged that preheaters for rotary kilns are desirable, but the subject is otherwise not well understood. It first must be realized that a preheater cannot cool the gases to any degree more than there is stone available to cool it with, and that the amount of stone available is a matter of fuel ratio. The more lime that is made, the more the stone that is required and the cooler are the gases. Every ratio will have its own specific minimum escaping gas temperature which cannot be reduced except through radiation from the shell or preheater or because of the drying of wet stone or slurry.

The lower curve of Fig. 8 gives the minimum temperature required for dry stone, with coal as fuel, and any particular kiln efficiency expressed in B.t.u. used per ton of lime. It cannot be lower unless there is unusual radiation loss or there is water in the kiln feed. It will almost always be higher and ordinarily it is considerably higher. The upper curve shows what it might be, but it will fluctuate up or down depending on many factors, including the excess air. Effective means for preheating can bring this down rather close to the lower curve, but not lower. Only through improvement of the general kiln efficiency is it possible to go lower. The curve shows that shifting to the left into the higher efficiency region reduces the temperature.

It is within the two curves wherein the preheating systems function, but the reason for the diversity in these curves is not strictly that of the preheating zone of the kiln but rather of the boundary section between the calcining and preheating zones. In the ideal case, this zone would be sharply defined. To one side of the boundary will be the preheating of stone; to the other the calcining. Incipient calcination will be at 1500 deg. F. and the gases should leave this zone at 1500 deg. F. Actually, this is far from being the case. Some of the stone has calcined before other parts are completely preheated and gases leave the incipient calcination point at 2000 deg. F. or more, rather than at 1500 deg. F. The difference constitutes "terminal temperature differential loss" which is the greatest single loss in rotary kiln operation, the source of this loss being indicated by "A" of Fig. 5, May, 1951, page 74.

The fact that the upper curve of Fig. 8 is so far above the lower one may not be entirely due to terminal temperature differential. It may be partly due to combustion extending into the preheating zone, in which case all fuel so burned is completely wasted. But the terminal differential loss is mainly due to poor heat transfer rate at the junction and the only thing to do is to correct the situation at the correct point. The only possible way to do it is to build in inserts, quadrants, to increase the surface for heat release and absorption, and to improve the mixing and the intimacy of contact of the gases with the stone. In an open kiln, conditions as shown in Fig. 9 will prevail while in a quadrant section conditions for the different positions will be more like Fig. 10.

In the case of the quadrated kiln, the bed is virtually turned over three times in each kiln revolution. All of the stone becomes exposed and the bed CO_2 tension is lowered. Such relationships can best be studied from models like that of Fig. 11.

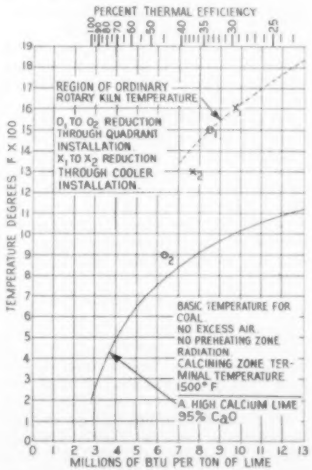


Fig. 8: Lime kiln waste gas temperature

The subject of quadrants may be an old story, but this particular strategic location for quadrants is new. While quadrants may have been tried and not have proved very lasting, new improved systems are in continuous development of which the "Hoffman" system assigned to Azbe Corp. seems most promising.

Quadrants located at the point reaching from the preheating zone fairly well into the calcining zone of the kiln would serve many useful purposes. They would act as a precalciner, aiding calcination of the finer portion of the charge at the inlet to the calcining zone, where it should be calcined, rather than at the discharge end where most of this calcination takes place in ordinary rotary kilns. In this respect, the quadrants could be called the "precalciner."

The quadrants would quickly cool the gases to below the calcining temperature level. Because of this the heat loss by radiation in the rear of the kiln would be of the relatively far less important low temperature level heat. Because of this function, we could call the quadrants a "high level heat intercept" as no heat capable of calcination would pass to the rear of the kiln.

There is much heat lost in the rotary kiln from the very hot and very radiant front section by direct radiation through the very large opening of the clear internal kiln diameter to the rear stone preheating section. These quadrants would save much of this and thus constitute a "radiant heat block."

Hot zone quadrants made of refractory material would tend to mix the kiln gases and would aid in terminating combustion sharply, thus preventing delayed burning into the preheating zone.

A further quadrant unit which could be of steel could be installed further back to act as the "preheater." However, the first unit, located at the stone-lime junction, would be the more important as it would control both terminal temperature differential loss as well as radiation loss. In this system steel quadrants would be more practical, even for the shorter kilns, which at present are not practical by themselves.

A study of the quadrant action reveals the following information as

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Fig. 9: Isotherm and heat transfer state of a rotary kiln cross section. Identification: (1) solids radiation to bed, (2) gaseous radiation to bed, (3) gaseous radiation to wall, (4) solids radiation to wall, (5) radiation from hot wall to hot bed, (6) radiation from hot wall to cool bed, (7) radiation to air stream, (8) radiation from hot wall to cool wall, (9) radiation—cooled wall to cooled bed, (10) conduction from inner wall to shell, (11) radiation loss from shell, (12) convection loss from shell, (13) conduction from wall to bed, (14) radiation from carbon to hot gases, (15) radiation to cool gases, (16) convection from wall to cool gases, (17) conduction within the bed. S—carbon from cracking of hydrocarbons, carbon from coke devolatilized, pulverized coal, ash particles, lime particles. G—gaseous radiation from H_2O and CO_2

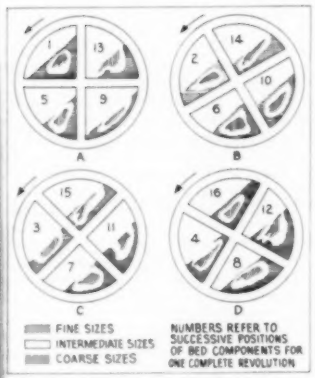


Fig. 10: Rotary kiln quadrant segment study

obtained, in part, from models and from actual installations. Practical results bear out conclusions drawn from the study of models.

1. There is a much greater surface available for dissipation of heat from the gases, tending to more rapid and more complete absorption of the heat generated by combustion.

2. Simultaneously the surface available to the stone and the lime for absorption of heat is greatly increased.

3. Heat absorption surface available to the lime and the stone is increased to a greater degree than the surface is available to the gases for dissipation of their heat. This is a distinct advantage. A summary of the surface available in square feet per running foot of kiln for different stone loads is presented immediately following.

	Open kiln section
Load	15.0 in.
Gas exposure	22.0
Material exposure	14.6

The above is calculated for a kiln of 8-ft. 6-in. inside diameter.

4. Kiln load is increased and, because of this, kiln retention time is increased, which in turn increases the chances for that transfer through the mass by conduction.

5. Quadration introduces into the kiln highly effective heat exchange surfaces which, during any revolution, are repeatedly being oriented for absorption of heat from the gases on one side while heat is abstracted by the lime on the other side. These surface conditions do not exist in conventional kilns.

6. The quadrant system introduces surfaces for the exchange of heat within the kiln which do not tend to waste heat to the outside as the kiln walls do.

7. Through quadration and more intimate mixing of gases there is less gas stratification and more rapid and complete combustion.



Fig. 11: Laboratory model of quadrated kiln

8. Radiation heat transfer is improved for any given condition of luminosity since four streams of smaller dimensions are, in this respect, more effective than one large stream.

9. Quadration brings the hottest gases, which ordinarily tend to flow along the top of the conventional kiln, closer to the surface of the lime; through this factor and for other reasons, such as a higher surface velocity, heat transfer by convection is increased.

10. A great improvement results because of the breaking up of size segregations of stone and lime and because of repeated exposure of the ordinarily submerged smaller sizes as illustrated by Fig. 10.

11. In addition there is a great reduction or complete elimination of the sliding tendency of the upper surface

Quadrated kiln section			
6 in.	9 in.	12 in.	15 in.
49.2	48.4	46.7	45.6
22.8	33.8	37.0	40.8

of the limestone mass, and assurance that the desirable roll-over flow is achieved.

12. In a conventional kiln very high temperature and a highly radiant state is necessary for high heat transfer. In a quadrant section, high heat transfer is possible at much lower temperatures and with a smaller kiln diameter which in turn tends to reduce the radiation loss from the shell.

13. In beds of calcining lime in rotary kilns, there is little permeation of outside gases and the CO_2 is rather close to 100 percent as shown in Fig. 9. This corresponds to a dissociation temperature of 1650 deg. F. while the dissociation temperature at the surface is much lower. This, in part, explains the retarded calcination of the ⅛- to ½-in. fraction. The other reason is that heat has to penetrate by conduction. This peculiar condition can occur where stone, which is partially calcined and becoming lighter, changes to an inner orbit of higher CO_2 concentration and is there, in part, recarbonated. We believe there is considerable recarbonation taking place in a rotary kiln bed. It is a form of heat transfer.

One other further important consideration is that when there are quadrants aiding in the calcination of the fines, close sizing of rotary kiln stone becomes relatively less important, which results in simplification of plant operation.

Kiln Draft

For high capacity, conventional kilns need to be of relatively large diameter to obtain the necessary surface. When quadrated they may be smaller and, when smaller, are more effective than if they are of larger diameter and quadrated. The intimacy of contact has a high value. It will be offset, of course, in a higher draft requirement, but that is exactly what indicates high heat transfer in the less radiant rear sections of the kiln.

As it is, most rotary lime kilns other than the new, long kilns, are operated with no draft other than a portion of that produced by the heat head of the slope. There may be draft in the dust chamber, but all of it is utilized at either the kiln inlet or kiln outlet. The draft drop through the kiln proper is very slight, often not measurable, which is an indication of poor convection heat transfer.

Some kilns operate under a forced draft from their own heat head, dusting out through the stone feed pipe. Then capacity is low, not because of the rotary kiln itself, but because of some external obstruction. Some kilns have good draft, but it is created by secondary combustion in the dust chamber which heats up the stack. That is not good either.

Every rotary kiln should have an induced draft system. Then complete

combustion will be more assured, higher capacity possible, damming of kilns permissible and constricted quadrant sections be permitted.

Results with Quadrants

Results that may be accomplished by quadration are shown by Fig. 12 on which the curves represent various kilns.

"A" is a very long kiln which has no higher capacity than kiln "D" and no better fuel ratio. One would imagine that, because waste gas temperature is very low, less than 700 deg. F., the kiln efficiency would be high, but it is not and a ratio of only about 3.3:1 is being obtained. At this ratio a normal kiln will have a waste gas temperature in excess of 1300 deg. F. as indicated by Fig. 8. So, what is wrong?

The explanation lies in the fact that the low temperature is due to high radiation from the rear kiln portion which is not lined. For the balance, the kiln is just a long kiln like "B," with a very long and relatively inactive preheating zone. No benefit is really obtained from the extra length, unless one would consider the rear section an advantage in that it permits nicely cooled gases to be made available to the exhaust fan. This is a point worth keeping in mind in determining what to do with extra kiln length in improving overly long kilns. It amounts to moving the real functions down the line and allowing the rest of the kiln only to cool the gases below what the stone is capable of doing.

Neither "A" or "D" had a cooler or preheater and while "A" had an induced draft fan "D" did not, yet "D" produced a ton of lime for 35 cu. ft. of kiln volume, while "A" required 68.2 cu. ft.

It may be presumptuous for us to do much judging of kiln "A," as we are not very familiar with it, but we are familiar with kiln "D" and also with "B" which is another long kiln. From that knowledge we can fairly well speculate on the conditions which govern in kiln "A."

All long kilns which are not forced have a long relatively idle mid-section, and the advantage of increased heat absorbing surface is in part or partially offset by increased radiation loss. To force such kilns is even more important than to force shorter units for, by forcing, one offsets the radiation loss and utilizes the extra surface to better advantage. Operating at 68 cu. ft. per ton of lime does not, however, constitute forcing. It is idling.

"B" kiln was improved to the "C" condition and from 62 cu. ft. per ton to 47 cu. ft. per ton. There is no reason why it can not be improved to 39 cu. ft. per ton. But whatever may be accomplished, it will still contain a relatively idle section as indicated by the flatness of the curve where the gases are cooled very slowly.

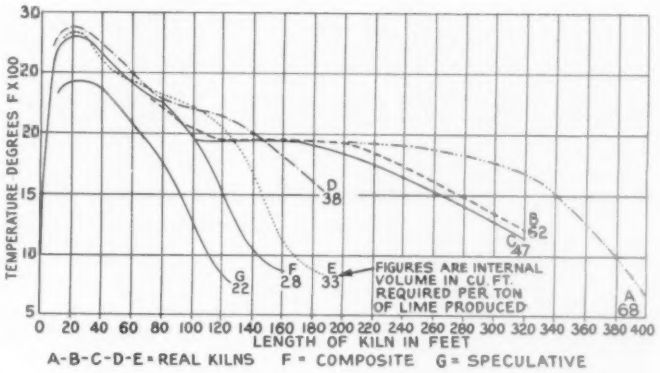


Fig. 12: Temperature gradients of various kilns and their volumetric effectiveness

"D" kiln lacks this flatness. It is the kiln on which the record previously described was established. It is an open, unelaborated kiln operating at 35 cu. ft. per ton. "E" represents the same kiln when quadrated. The gas temperature has dropped from 1550 deg. F. to 850 deg. F. and there is little flatness of the curve. The kiln works at a good rate all through, particularly in the quadrated rear section and the radiant front section. Capacity was not increased much, only to about 32 or 33 cu. ft. per ton. Improvement was realized in fuel rather than in capacity, which always is a mistake. In this case it is due to existing equipment limitations and it was necessary to do so.

"F" kiln is a composite, consisting of the first 100 ft. of kiln "C" and the last 60 ft. of kiln "F." A capacity of somewhere around 25 cu. ft. per ton should then be obtained, but this still is not the limit. Conditions of kiln "G" should be possible and a production of one ton for each 22 cu. ft. What this requires already has been presented by our Report No. 756, "A Rationalized Rotary Kiln System" which was published in ROCK PRODUCTS, March, 1950.

Kiln Evaluation

In the evaluation of a kiln and its performance there are various classifications and gradations possible which seem impossible to correlate. However, an attempt was made to do so and is presented in Fig. 13. The findings are not absolute but nevertheless are fairly indicative of a perfected system.

As the first item, there is the rotary kiln as to its arrangement and attendant equipment. For example, class 0 would be at the lowest line, being a simple kiln without exhaust fan, cooler, and preheater and without any special arrangements to improve its performance. It is just a relatively short, simple kiln.

Kilns of class 10, 20, and 30 would

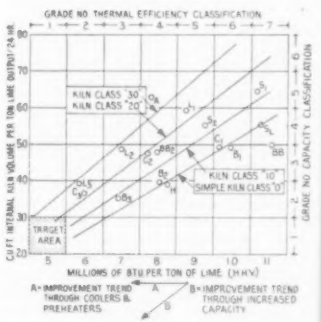


Fig. 13: Rotary kiln classification and improvement trends

be progressively more elaborate in either one way or another. The lines lead into a target area. Our target for the rotary kiln is a capacity of a ton of lime for each 20 to 30 cu. ft. and a fuel consumption of from 4,500,000 to 5,500,000 B.t.u. Any kiln falling into this area would have a thermal efficiency grade of 1 and also a capacity grade of 1. If it was a kiln of a class 30, it would have a better thermal efficiency at low capacity than the simple kiln of class 0.

Improvement of performance may be through increase of capacity, through improvement of equipment, or both. If done through increased capacity, progress towards the target area will be diagonally down, whereas if the improvement is through improved equipment without change of capacity, then progress will be shown straight across and the approach to the target would be less than if capacity had been increased as well.

Taking kiln B 1 of 49 cu. ft. and 9,600,000 B.t.u. per ton and plotting it on the grid, it classifies itself as a simple kiln into class 0, thermal efficiency grade 6 and capacity grade 3. If desired one could use fractions, but

(Continued on page 140)

KANSAS CITY PERLITE EXPANDING PLANT

Panacalite Perlite, Inc., operates compact perlite expanding plant; tests made on concrete roof decks using company's product as aggregate to prove quality

By TIP BROWN

THE PERLITE INDUSTRY, young in years, has been demonstrating its usefulness as a lightweight aggregate in the plastering field and is now pursuing an ambitious program for recognition as a Siamese twin with portland cement in the vast field of fireproofing of wood and steel structural members and structural roof decks. The industry claims that 40,000 tons of steel could have been saved in 1950 by taking full advantage of the high fire-resistant values of its product. In view of the imminent demand of military requirements, steel shortages may give unusual significance to this possibility. Savings in original costs and in space are said to be substantial in the new design for non-loadbearing walls and to provide a 4-hr. fire rating for 6-in. wall thicknesses. Some recent large warehouse and factory installations of perlite as a concrete aggregate in roof decks have focused interest on this use of the material. The insulating value, elasticity, resistance to sharp blows, nail holding power, and low cost have aroused attention of the building industry to the possibilities of added uses of the product.

Perlite is a volcanic rock, mined in the western part of the United States, which, when quickly heated to above 1800 deg. F., expands to form a lightweight, non-combustible, glass-like material of cellular structure. The expanded material, white or light gray in color, is about 1/10 the weight of dry sand. Four or more mining companies are now producing perlite ores in Oregon, California, Nevada, Utah, Arizona, Colorado and New Mexico. Processing, or "popping" plants as they are sometimes called, number about 100 and 50 of them were established as late as the year 1950, representing an increase of 350 percent in production over the preceding year. They are located in 40 different states over the country.

Panacalite (accented on the second syllable) Perlite, Inc., 311 South 5th Street, Kansas City, Kan., completed its plant in October, 1949. The concern operates under a franchise from Combined Metals Reduction Co., Salt Lake City, Utah, for use of "Panacalite" perlite ore produced at three different mines in the near vicinity of Caselton, in the east central part of Nevada near the Nevada-Utah line. (See ROCK PRODUCTS, October, 1950, pp. 98-100, for article on Combined Metals Reduction Co., entitled "Processing Perlite Ore for Controlled Expansion."). Franchises have been granted by the Combined Metals Reduction Co. for other plants at Richmond and Los Angeles, Calif., Washington, D. C., Oklahoma City, Okla., Pittsburgh, Penn., Dallas, Texas, and Salt Lake City, Utah.

V. M. Samuels is president and manager of the Kansas City operation and also vice-president of the Panacalite Perlite Co., Pittsburgh, Penn.; Dr. Victor R. Dacken, Cody, Wyo., is vice-president, and W. J. Franklin, also associated with the Pittsburgh plant, is secretary-treasurer. Both Mr. Samuels and Mr. Franklin are widely known in the Rocky Mountain area, where for many years they were in partnership in tunnel driving and tunnel concrete lining for railroad, highway and utility projects and for the U. S. Bureau of Reclamation.

Frank Calkins, sales engineer for the Kansas City company, was division engineer for ten years for the Moffat Line (Denver & Salt Lake Ry.) now a part of the D&RGW railroad. Jack A. Pearson is in charge of the office.

Plant Facilities

The plant is located on company-owned ground with a private switch leading to the tracks of the Union Pacific railroad. The building, 50 ft. wide and 120 ft. long, is a Butler steel structure with concrete foundations and floor. Pavement is within easy access for outbound shipping by truck. The ore is shipped to this particular plant in box cars which contain 55 to 60 tons of ore which has been graded by crushing and screening down to minus 14-mesh at point of origin. It is practically dust free and is a steel gray in color. The approximate shipping time from mine to plant is one week.

The ore is unloaded into a storage bin adjoining the plant at the rear and holding 120 tons. The ore is transported from storage to a receiving hopper at the base of a vertical bucket elevator and lifted to a height of 30 ft. where it flows by gravity into a 12-ton storage hopper. The elevator buckets are 12 in. long, 4 in. wide and 4 in. deep. Screens are installed at both the base of the elevator and at the discharge boot to eliminate any extraneous matter.



Plant of Panacalite Perlite, Inc.

Expanding Process

From the hopper, material flows by gravity to the expanding furnace through a lever-controlled orifice which insures uniformity of flow of ore. A gas-fired furnace designed by the Combined Metals Reduction Co. and manufactured for them by the O. J. Scherer Co., Las Vegas, Nev., has a rated capacity of finished product of 360 cu. ft. per hr. A temperature of 1800 deg. F. is used in the expanding process.

The bagging is done by electrically-driven augers which force the material into valve-type multiwall paper bags 22 x 40 x 6 in., containing approximately 4 cu. ft. of the finished product and weighing 30 lb. A Stoker bagging machine, especially designed for the purpose, has a vibrating platform for compacting material in the package.

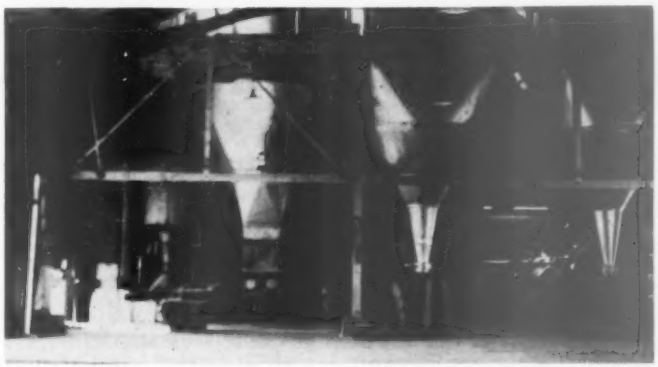
Sales Distribution

The plant serves the western half of Missouri, eastern and central Kansas, and southern Nebraska. Trucks carry a maximum load of 450 sacks; carload rail shipments carry 1200 bags in 50-ft. freight cars. Deliveries are made through established building material dealers to the trade. Small shipments are usually handled locally by dealer trucks.

The material is introduced to the general or the plastering contractors by the company sales organization. Architects and engineers have been made familiar with the product through frequent visits of sales department representatives and have given the product good representation in their specifications. The average use in plastering work is 3 cu. ft. of perlite to 100 lb. of gypsum plaster. Old timers in the plaster industry have welcomed the light, fluffy composition because of ease of handling, hoisting, and placing and as a health booster in "making their arms last a good many years longer." Owners benefit from the added sound-proofing, insulating, fire-resistant and crack-resistant values. The company is particularly proud in having furnished a large amount of perlite for plastering in the new 624-unit Twin Oaks apartment building now nearing completion. The building is the largest apartment development in Kansas City, Mo. The plastering contractor is E. J. Walters Plastering Co.

Concrete Roof Decks

One of the outstanding uses of the expanded material is in lightweight concrete roof decks either poured in place or installed in sections or precast units as required by the individual job. The use of 100 percent inorganic materials in this type of construction gives a completed job that is said to be unaffected by water, is completely fireproof, and has low thermal conductivity and good insulation value.



Interior view of processing plant; bagging bins at right

Recent tests by the company on its manufacture of roof deck units are given here together with illustrations of the methods used. The report which follows is the first public release of the information.

Roof deck slab, test sample report:

The perlite concrete roof deck slab as shown in the accompanying picture was constructed for the purpose of determining the ultimate live load this type of lightweight concrete and corrugated sheet steel would safely support. Construction and method of test are as follows:

Date slab was poured: October 11, 1950

Date of test: November 8, 1950

A temporary form constructed of 2- x 4-in. material, was used to support the slab which was 4 x 16 ft. in size. Steel corruform (standard gauge, black) was used to pour the concrete on. The 2- x 4-in. frame-supporting material was spaced at 48 in. on centers to represent joists. The steel corruform was then applied. A welded mesh, constructed from No. 10 wire with 6-in. squares (6-6-10-10), was placed directly on the surface of the corruform. Perlite concrete was poured over this form to a thickness of 2½ in. During the first three days of curing, the slab was dampened with water at irregular intervals.



Concrete roof deck slab under test (1:5 mix)

The first 8 ft. of the test slab consisted of 1:4 mix ratio by volume, and the remaining 8 ft. poured with a 1:5 mix ratio.

The actual test was comparatively simple, but adequate to provide the information desired. Concrete block, weighing approximately 45 lb. each, were placed on a 4-ft. span having the 1:5 mix perlite concrete. Each block was placed to allow ⅛ in. on all sides to avoid any possible bridging action of the block proper. A total of 59 block were placed on the 16-sq. ft. area of the 4-ft. test section of the slab. The total weight of block was 2655 lb., or 165.93 lb. per per sq. ft. In addition to the block weight, three men weighing a total of 500 lb. stood on top of the block. Since this did not result in a failure of the test slab, the three men then jumped on the block. Only a slight deflection was noted from this action. The total load withstood was 3155 lb. (block, 2655 lb.; men, 500 lb.) on the area of 16 sq. ft., or 197.19 lb. per sq. ft. No failure has resulted from the test as made. The concrete block have remained in place for over 30 days at this writing (12-15-50).

On a section of the 1:4 mix portion of the test slab, three men weighing a total of 500 lb. jumped together with their combined maximum effort for 20 consecutive times to bring about a failure. The slab finally started cracking along the joist and then through the center of the span.

A recent installation of roofing using the "Panacalite" roof deck was a 37,112-sq. ft. surface on the barrel warehouse of the Jones & Laughlin Steel Co. in North Kansas City, Mo. Howard Swan was the general contractor on the job.

Crushing Practice and Theory

Part VII. Jaw crushers, types and special uses

By BROWNELL McGREW*

THAT POPULAR AND RELIABLE workhorse of the crusher family, the jaw crusher, has been developed in a variety of forms that probably outrivals the variations of the gyratory crushing principle. Several different types of motion have been devised, and a great deal of mechanical ingenuity has been displayed in the design of mechanisms to generate these motions. Despite the infinite variety of details, however, most of the jaw crushers in popular usage today have actions which closely approximate or exactly duplicate one of the three types to be discussed in the following pages. These are:

1. The Blake-type crusher.
2. The Dodge-type crusher.
3. The single-toggle type crusher.

Blake Type Crusher

Both chronologically, and by virtue of its standing in the field of heavy-duty crushing, the Blake-type crusher stands first in the list. All of the large, heavy-duty primary crushers of the jaw type are built around the Blake principle which, for simplicity and brute strength, is unsurpassed by any mechanism thus far devised for rock and ore breaking.

A sectional view of a jaw crusher which incorporates the Blake double-toggle mechanism is shown in Fig. 1. The Blake crusher in common with all machines of the jaw family is built into a rectangular frame, at one end of which is located the crushing chamber; in fact, the end of the box-frame constitutes the stationary jaw. The movable or swing jaw is suspended from a cross-shaft (swing jaw shaft) at its upper end, this shaft in turn being supported at each end in bearings at the top of the two sides of the crusher frame.

The actuating mechanism consists of the eccentric-shaft (also supported in bearings in the sides of the frame), the pitman, and the pair of toggles, which span from swing jaw to pitman, and from pitman to rear end of the frame. The motion of the eccentric-shaft is transmitted through the pitman to the inner ends of the toggle pair, and through their action to the lower end of the swing jaw, which pivots around the supporting shaft at its upper end. The motion is similar in one respect to that of the standard gyratory crusher, in that it is greatest at the discharge opening, and gradually decreases toward the upper part of the chamber.

Jaw-crusher frames have been the subject of considerable variety in details of design and have been built of several different materials. Originally all frames were of cast iron, as was the case with all of the early gyratory machines. Then, as larger sizes were developed, cast steel became the common medium for all large and medium size crushers. When the Superior line was designed, semi-steel was selected for the frame, and steel rods extending through the side members from end to end were provided to absorb the tensile stresses. This type of construction is used in all sizes of this line, except in the 84-in. machines, where cast steel has been used exclusively up to the present time, these cast-steel frames being reinforced for heavy-duty applications in the same manner as the semi-steel frames of the smaller machines. Of recent years the trend has been very definitely toward the use of welded design, with side members of rolled steel plate, reinforced by stiffening ribs.

In past years both chilled cast iron and manganese steel were used in jaw plates for the Blake crusher, depending upon the kind of rock to be crushed. The chilled iron plates did not possess the requisite strength to resist breakage, even when used on comparatively soft rock; in our case we have abandoned them in favor of manganese steel on all of our jaw crushers, regardless of size.

The Superior crusher is representative, in its general proportions, of the prevailing practice in Blake crusher design for a number of years. In this respect it is probably just as well entitled to be classed as a "standard" type as the gyratory crusher which goes by that title. It is true that refinements have been made in almost every detail, as compared to early models, but the basic action and the general proportions of the crushing chamber are much the same.

As a matter of fact, aside from these refinements in mechanical details, the only important departures from the original Blake design that had been tried, until quite recently, consisted of: (1) alterations in the relative positions of stationary and swing jaws with respect to the vertical; (2) the introduction of curved (non-choking) jaw plates.

The original Blake crusher was designed with a vertical stationary jaw. Probably the first departure from this arrangement was an 84- x 66-in. crusher, built in 1914. This machine

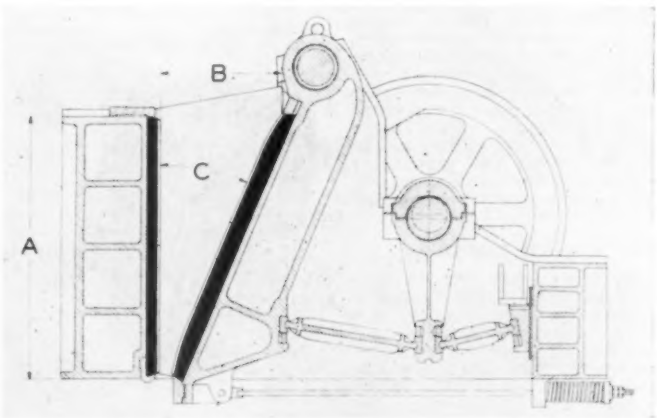


Fig. 1: Cross sectional detail of modern type double-toggle crusher

*Allis-Chalmers Manufacturing Co., Los Angeles, Calif., district office.

incorporated a reversal of the conventional design, in that the swing jaw was made vertical. Later, when the Superior line was developed, a compromise between these two extremes was used in several of the sizes; that is, both jaws were sloped. Each of these three arrangements has certain features which are advantageous, and others which are unfavorable. Present indications are that the original arrangement, with vertical stationary jaw, will continue to hold a leading position.

Crushing angles in standard Blake-type machines generally run in the neighborhsod of 27 deg. at the minimum open-side discharge setting. The ratio-of-reduction at minimum recommended settings and with straight jaw plates average about 8:1, in the range of sizes from 15- x 10-in., to 60- x 48-in., inclusive.

Straight Jaw Plates

Fig. 2 shows a diagram of a standard type of Blake crusher with regular or straight jaw plates. This type of plate has been the standard from the time of its inception, emulating, in this respect, the straight concaves in the gyratory machine. And it will be noted that the theoretical action in this straight-plate jaw chamber follows quite closely the pattern of the action in the straight-concave gyratory chamber.

Calculations for the jaw crusher chamber are somewhat simpler than in the case of the gyratory because the volumes included between the successive pairs of horizontal lines are rectangular in plan, whereas, in the gyratory we have to deal with annular volumes (actually, a descending spiral, rather than flat rings). But, when the line-of-mean-diameters in the gyratory chamber parallels—to a close approximation, at least—the centerline of the crusher, the general characteristics of the two crushing chambers, with respect to ratio-of-volume-reduction and concomitant reduction

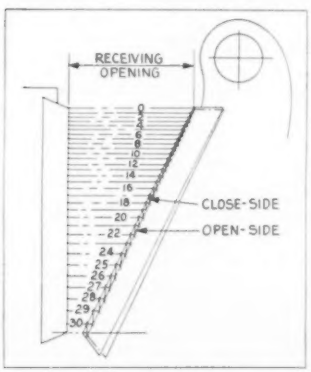


Fig. 2: Diagram of straight jaw plate crusher

in percentage of voids are similar. Crushing angles and throws would of course have to be the same for the comparison to be exact.

There is one readily discernible difference between the two diagrams we are comparing; the drop per stroke in the jaw crusher diagram is noticeably smaller. This difference is most pronounced in the upper part of the chamber. The reason for the difference is two-fold. In the particular machines selected for these diagrams, there is a difference of several degrees of crushing angle in favor of the gyratory; this accounts for the *average* difference over the full depth of the chambers. Secondly, the motion of the swing jaw, at the top of the crushing chamber is, proportionately, smaller than the movement at the top of the gyratory chamber. The reason for this is that the distance from the top of the crushing chamber to the fulcrum-point—as compared to the total length from discharge-point to fulcrum-point—is smaller in the case of the jaw crusher. This is generally true of Blake-type crushers as compared to gyratories except for the vertical swing jaw type, in which the swing jaw is carried up some distance above the top of the stationary jaw.

The close proximity of the fulcrum-point to the receiving opening gives the type of crusher we are considering enormous leverage on large blocks of stone, and the small motion tends to decrease the shocks incidental to gripping and shattering such blocks. From the capacity standpoint, the smaller drop per stroke is compensated for by the fact that the jaw crusher speed, for comparable sizes, is higher than the eccentric-speed of the gyratory.

Non-choking Jaw Plates

When the non-choking concave demonstrated its capabilities in the gyratory crusher, it was only natural that the principle should be applied to the jaw crusher. But, inasmuch as the Blake-type jaw is used very largely for primary breaking, where maximum receiving opening is, more often than not, a controlling factor, the application of non-choking plates to standard machines of this type has one unfavorable aspect, as will be evident from an examination of Fig. 3, "Standard Blake jaw crusher — non-choking swing jaw plate." This diagram shows the same machine as the last one considered, except that the swing jaw is fitted with a curved jaw plate.

These non-choking jaw plates have been developed in two styles, reversible and non-reversible. The advantage of the reversible design has been outlined in connection with its application to the gyratory reduction crusher. For both types of jaw plate, the effective receiving opening is reduced, as compared to the standard, straight-

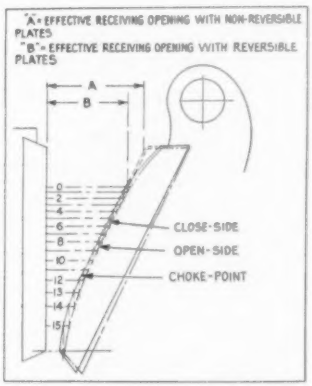


Fig. 3: Diagram of jaw crusher with non-choking swing jaw plate

plate setup. For the non-reversible plate, this reduction is determined by the actual increase in depth of the plate, resulting from the introduction of the curve. For the reversible plate, it is established by the point where the tangent to the curved surface coincides with the maximum angle of nip for the material being crushed. Similar restrictions were outlined in our discussion of non-choking concaves in gyratory crushers.

Regarding the reversible plate, it should be noted that, while that portion of the chamber above the point of nip does no crushing, it does constitute an "active" receiving hopper and, as such, is of definite value in minimizing bridging across the receiving opening. For applications which do not require the full rated receiving opening of the crusher, non-choking jaw plates offer a substantial improvement in performance, an improvement comparable to that resulting from the substitution of non-choking concaves in the gyratory crusher. While this is readily apparent from a comparison of the two diagrams we have presented, more concrete evidence is contained in the table of capacity ratings, which gives ratings for both types of jaw plates, for sizes up to, and including, the 60- x 48-in. machine.

High-Capacity Blake Crusher

When the non-choking feature was being applied to existing crushers of the gyratory type, it was found that in several machines, the attendant reduction in receiving opening could be partially offset by sloping the straight portion of the concaves at a wider angle than that for which the top shell was originally designed, because some of these older machines were designed with very conservative crushing angles. Generally speaking, however, this was not true of existing lines of jaw crushers. It is true that prevailing angles could be widened in

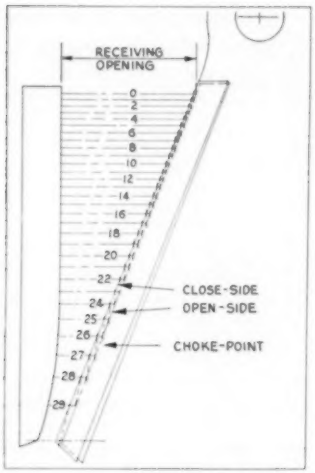


Fig. 4: Diagram of new type crushing chamber

certain cases, and for certain applications; but the jaw crusher, more than any other type of crusher, is called upon to handle very hard, tough materials, and standard designs must be based on that kind of duty. Furthermore, as was pointed out in our discussion of gyratory crushers, a certain amount of slippage occurs in all crushing chambers, and the jaw crusher, which is not essentially a high-capacity machine, could ill afford to have any additional slippage built into it.

A study of these factors convinced designers that, to fully realize the advantages of the non-choking feature in the Blake-type crusher, it would be necessary to develop a new line, with crushing chambers designed specifically for that type of plate. It was realized, that improved performance —particularly on hard rock—would result from a substantial decrease in the prevailing practice with regard to crushing angles. And, thirdly, inasmuch as the jaw crusher is preponderantly a primary breaker, it was desirable that these improvements be incorporated without sacrificing valuable inches of receiving opening.

These ideas were given concrete form in a new line of all-steel Blake-type jaw crushers, with frames of welded design, and several interesting and important refinements in mechanical details, including an improved system of lubrication.

Fig. 4 shows a diagram of the crushing chamber in one of the new type crushers. This diagram covers a machine of the same receiving-opening size as the standard type on which the two preceding diagrams were based. A brief comparison will indicate why the new crusher has distinctive performance characteristics.

At first glance, the most striking difference lies in the depth of the crushing chambers, due partly to the non-choke design, and partly to the decreased crushing angle. This diagram was laid out for the same jaw-motion as the standard-crusher diagram, and it will be noted that about the same number of strokes are required to move the material down from receiving-opening to discharge-opening. However, it will also be noted that the areas between successive lines are substantially greater, which is a direct indication of the relative *theoretical* capacities of the two crushers. In addition to this theoretical difference, there is an "imponderable" asset which accrues to the decreased crushing angle—an asset which is not subject to pre-calculation, but which contributes in no small degree to the excellent performance of the new machine, not only in increased capacity, but in reduced rate of wear on the jaw plates.

Ratings of the developed sizes of the new crusher are given in a table.

Naturally, it costs money to build such characteristics into a crusher, and, for that reason, it is hardly to be expected that this improved design will entirely supersede existing standard models of the Blake crusher. In very many applications, receiving opening, rather than optimum capacity, is the predominant factor. For such applications—especially for those involving soft, or medium-hard material—the lower-cost standard crusher will probably continue in favor.

The Dodge Crusher

A sectional view of the Dodge-type jaw crusher is shown in Fig. 5. The mechanism of this machine is so simple that it is hardly necessary to enlarge upon what can be gained from an examination of the cut.

In one respect, the Dodge machine is a reversal of the actions we have been discussing; its movable jaw, being pivoted at a point below the discharge opening, has minimum movement at that opening, and maximum movement at the receiving opening. Because the choke-point and the point of least motion coincide in this crusher, it is to be expected that it would be lacking in capacity, as compared to similar sizes of the Blake-type crusher. The Dodge machine has the virtues of simplicity, low cost, and ease of adjustment and maintenance, but, due to its low capacity, its field is restricted to rather narrow limits.

By reason of the small movement at the discharge opening, the natural

CRUSHER SIZE (IN.)	R.P.M.	JAW MOTION (IN.)	H.P.	CAPACITY IN TONS (2000 LB.) PER HOUR @ OPEN SIDE SETTINGS OF:									
				4"	4½"	5"	5½"	6"	6½"	7"	7½"	8"	9"	10"
36 X 25	210	1-1/16	60-75	200	220	240	250	260	280	290	300			
42 X 32	200	1-3/16	100	250	270	290	310	330	340	360	380	400		
48 X 42	180	1-1/2	125-150			380	400	420	450	470	490	510	540	580
60 X 48	170	1-7/16	150-250				450	480	500	530	550	570	610	660

CRUSHER SIZE (IN.)	R.P.M.	JAW MOTION (IN.)	H.P.	CAPACITY - TONS (2000 LB.) PER HOUR @ SETTING			
				1/2"	3/4"	1"	1½"
4 X 6	275	1/2	3	¼	½	1	
7 X 9	235	13/16	6		1	2	3
8 X 12	220	19/32	10		1½	3	4
11 X 15	200	1-5/8	15		2	4	6

CRUSHER SIZE (IN)	R.P.M.	JAW MOTION (IN.)	H.P.	CAPACITY IN TONS (2000 LB.) PER HOUR @ OPEN SIDE SETTINGS OF:											
				*	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
24 X 15	210	7/8	35	A	19	34	48	62							
			75	B	30	50	70	90							
36 X 24	210	15/16	75	A		45	66	89	110						
				B		80	100	130	170						
42 X 40	190	1	125	A			90	120	152	182	230				
				B			140	190	230	270	320				
48 X 42	190	1-1/16	150	A				135	173	215	262				
				B				210	250	300	350				
60 X 48	170	1-1/8	200	A				155	215	250	285	325			
				B				270	320	380	450	510			

*A-- CAPACITY WITH STRAIGHT JAW PLATES
B-- CAPACITY WITH CURVED JAW PLATES

Comparison charts of, from top to bottom: Blake-type crusher, Dodge-type crusher, and single-toggle type crusher

expectation would be that the Dodge crusher would deliver a very uniform product, but this would hold true for only a very limited feed rate. The rapid action at the top of the crushing chamber tends to crowd material into the lower zone; this, as we have seen, tends to promote a packed condition, with accompanying production of fines by attrition. The machine works well on hard, clean-breaking rock, or ore, but does not have characteristics suitable to the handling of soft, friable materials which incline to cling and pack.

The Dodge crusher fits into a number of low-capacity applications, such as small mining operations, sampling plants, laboratory work, and numerous special applications where a small product is required, but where the tonnage involved does not justify a two-stage operation. The machine is capable of making a very large ratio-of-reduction, which is an important feature for the types of application outlined. A table of ratings of Dodge crushers is given.

Single-toggle Jaw Crusher

A sectional view of the single-toggle type of jaw crusher is shown in Fig. 6. In one respect, this machine is similar to the Dodge crusher; the movable jaw has its maximum movement at the top of the crushing chamber, and minimum movement at the discharge point. The motion is, however, a more complex one than the Dodge motion, being the resultant of the circular motion of the eccentric-shaft at the top of the swing jaw, combined with the rocking action of the inclined toggle plate at the bottom of this jaw. The motion at the receiving opening is elliptical; at the discharge opening it is a thin crescent, whose chord is inclined upwardly toward the stationary jaw. Thus, at all points in the crushing chamber, the motion has both, vertical and horizontal, components.

It will be noted that the motion is a "rocking" one. When the swing jaw is rising, it is opening, at the top, during the first half of the stroke, and closing during the second half, whereas the bottom of the jaw is closing during the entire up-stroke. A reversal of this motion occurs during the down-stroke of the eccentric.

The horizontal component of motion (throw) at the discharge point of the single-toggle crusher is greater than the throw of the Dodge crusher at that point; in fact, it is about three-fourths that of Blake machines of similar short-side receiving-opening dimensions. The combination of favorable crushing angle, and non-choking jaw plates, used in this machine, promotes a much freer action through the choke zone than that in the Dodge crusher. Capacities compare very favorably with comparable sizes of the Blake machine with non-choking plates, and permissible discharge settings are finer. A table of ratings is given.

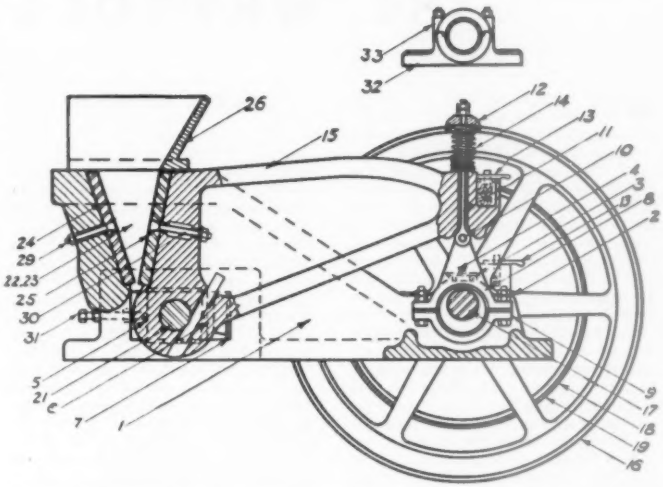


Fig. 5: Dodge-type crusher parts: (1) Frame, (2) Main bearing cap, (3) Oil well cover, (4) Oil well cover spring, (5) Swing jaw shaft box, (6) Breaking plate, (7) Shim, (8) Pitman, (9) Pitman cap, (10) Pitman pin, (11) Pitman eye bolt, (12) Pitman jaw spring cap, (13) Swing jaw and Pitman oil well cover, (14) Swing jaw spring, (15) Swing jaw, (16) Flywheel, (17) Eccentric shaft, (18) Loose pulley, (19) Tight pulley, (21) Swing jaw shaft, (22) Left hand side liner, (23) Right hand side liner, (24) Plain stationary jaw plate, (25) Plain swing jaw plate, (26) Hopper, (29) Stationary jaw plate bolt, (30) Swing jaw plate bolt, (31) Dog bolt, (32) Outboard bearing, (33) Outboard bearing cap

Applications

The single-toggle type jaw crusher has been developed extensively. Because of its simplicity, light weight, moderate cost, and good capacity, it has found quite a wide field of application in portable crushing rigs. It also fits into the small, single-stage mining operation much better than the slower Dodge type. Some years since, this type was developed with very wide openings for reduction-crushing applications, but it was not able to seriously challenge the gyratory in this field, especially when the high-speed modern versions of the latter type were introduced.

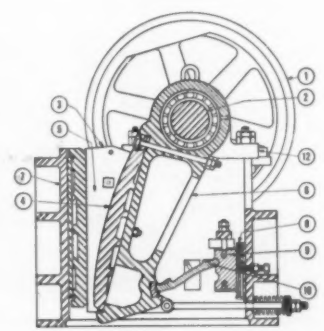


Fig. 6: Single toggle-type crusher

Due to the pronounced vertical components of motion in the single-toggle machine, it is obvious that a wiping action takes place during the closing strokes; either, the swing jaw must slip on the material, or the material must slip along the stationary jaw. It is inevitable that such action should result in accelerated wear of the jaw plates; consequently, the single-toggle crusher is not an economical machine for reducing highly abrasive, or very hard, tough rock. Moreover, the large motion at the receiving opening greatly accentuates shocks incidental to handling the latter class of material, and the full impact of these shocks must be absorbed by the bearings in the top of the swing jaw.

The single-toggle machine, like the Dodge type, is capable of making a high ratio-of-reduction, a faculty which enables it to perform a single-stage reduction of hand-loaded, mine-run ore to a suitable ball mill, or rod mill, feed. Within the limits of its capacity, and size of receiving openings, it is admirably suited for such operations. Small gravel plant operations are also suited to this type of crusher, although it should not be used where the gravel deposit contains extremely hard boulders. The crusher is easy to adjust, and, in common with most machines of the jaw type, is a simple crusher to maintain.

(To be continued)

THE "WHY" OF LIMING

By J. B. PETERSON*

WHEN YOUR SECRETARY, Mr. Ralph Simpson, was discussing with me the title for this talk, he suggested I might enlarge upon the theme 2 + 2 = 5. This theme was developed in a recent article by Dr. Byron T. Shaw in the journal *What's New in Crops and Soils*. The statement 2+ 2 = 5 represents one of the fundamental truths of nature for in many cases 2 + 2 does = 5 and not 4. By this we mean that in nature many of the factors which go to produce a result aid and abet each other. If we have a way of measuring the individual effect of each factor, for example, those factors contributing to the yield of a crop, we shall find that the sum of the effects of all the factors acting alone is usually less than the combined effect of the same factors acting together. This is because the different things which are necessary for plant growth often help each other, resulting in what we call interaction. For example, if we lime an acid soil we get more than just the benefit of lime alone on the crop; we get the effect of increased availability of phosphorus around the roots. We also get other effects such as the benefit of the nutritive value of the calcium supplied by the lime.

Interaction Experiment

The effect of interaction is well illustrated by the results of a rotation experiment in Jennings county, Indiana, conducted by the Purdue Agricultural Experiment Station. In this experiment the cash value of the increased yields per rotation of corn, wheat and clover hay were compared. The results are as follows:

Treatment	Value of increase per rotation due to treatment
Lime**	$ 26.66*
NPK***	58.76
Lime & NPK	103.75

*Present values used. Corn at $1.25 a bushel, wheat $2 and hay $20 a ton.
**Lime 3 tons in 1921 and 2 tons in 1935, original pH of soil was 4.7.
***NPK 100 lb. of 0-12-8 for corn; 300 lb. of 2-12-8 for wheat.

Here the effect of lime alone, $26.66, plus that of fertilizer alone, $58.76, came to only $85.42, whereas when these two treatments were combined in practice, the resulting increase in crops for the rotation was $103.75. This is typical of the interaction effect in nature.

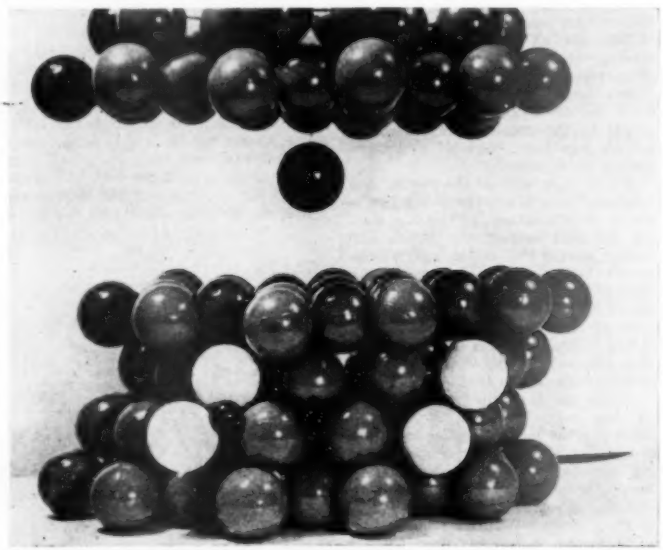
Soil Constituents

To understand more clearly all the interactions involved when lime is put on the soil, and which in total effect the growth of the crop, let me take you right down into the soil itself to see what the soil is made of and what there is in the soil that is affected by liming in such a way that better plant growth results.

A real advance in understanding the soil has been made in the last 20 years with research which has revealed the true nature of the clay fraction in the soil. It is the clay fraction which is the seat of most chemical activity in the soil, particularly the chemical activity which influences the acidity or neutrality of the soil. For a long time we thought the clay was just an amorphous mass, since it was so small we could not see it. Empirical chemical studies did not reveal much about the true nature of clay because of the many impurities which occurred in it. Many attempts to characterize the clay through chemical studies did not reveal very definite ratios between the components, namely silicon, aluminum, oxygen and iron, with the result that very little success was made in identifying and classifying different types of clay. However, with the development of X-ray techniques it was discovered that clays were composed of very definite crystalline mineral types, the two most important ones being the Montmorillonitic and Kaolinitic clays. These clays were found by the new techniques to exist in soils and to be identical to the clays long known in certain natural deposits. During the last 20 years, and particularly in the last 10 years, techniques for identifying the clays and for estimating them quantitatively have advanced very rapidly. We are now at a stage where we can tell to a reasonable degree what types of minerals exist in the clays of our soils, and to a fair extent the quantities.

Clay Structure

These clays are made up of atoms of silicon, oxygen, hydrogen and aluminum. The accompanying figure is a model showing what a cross section of the unit cell of a montmorillonitic clay crystal would probably look like if we could actually see the atoms. The gray balls represent oxygen atoms, the white ones hydroxide radicals, the small black ones are aluminum and down out of sight between the gray balls are the little white balls representing silicon atoms. The large black ball represents a potassium ion absorbed between two plates of montmorillonite. This picture shows a very definite arrangement of atoms which occurs in this crystal. Such a definite arrangement of atoms is a character-



Structural model of montmorillonitic clay unit cell; gray balls represent oxygen atoms, white ones hydroxide, and small black balls represent aluminum. Silicon atoms are hidden inside crystal, and large black ball represents atom of absorbed potassium

*Head, Agronomy Department, Agricultural Experiment Station, Purdue University, Lafayette, Ind. Text of a speech presented before Indiana Mineral Aggregates Association, March, 1951.

istic of all crystalline material. This picture represents just a small segment of an ordinary clay crystal. The clay crystal would probably consist of four or five layers similar to the one shown. These layers would be stacked up on top of each other and would extend out laterally in all directions for quite an enormous distance. In real life this total crystal would probably be less than a micron across its largest dimension. When we realize that a micron is 1/1000 of a millimeter and a millimeter is 1/1000 of a meter, we know that this is really a pretty small piece of matter.

In a wet soil these clay particles are surrounded with the water in which free ions are in solution. Since these ions are traveling around in solution they may come in close contact with the clay, and as they approach the clay they will run into a sphere or zone of attraction from which they will have a hard time getting away. Thus it is that clay particles are able to hold ions very tightly near their surfaces and prevent them from leaching away or disappearing from the soil too rapidly.

It is believed that plants can get those ions which they need, that is, nutritive ions like calcium, potassium, etc., directly from these clays by an exchange between the ions on the clay and those inside the root cells. It is also known that the plant can feed upon the ions which are not so tightly held around the clays but are out in the solution where the attractive forces near the clay do not interfere with their movement. Thus it is that we have sort of a double system set up in the water around the clay, one system being that of the tightly held ions next to the clay and the other of the free ions out farther away from the clay which are free to migrate and move around in the solution at will according to the habit of ions.

It so happens that the amount of any kind of ion out in solution is affected by the amount of that ion which is held closely around the clay. It is the hydrogen ions in the solution which make the solution acid. It is these free hydrogen ions which determine the pH of a soil. In fact, pH is a measure of the hydrogen ion concentration of a solution. Since the number of hydrogen ions in solution is affected by the number of hydrogen ions closely attracted to the clay, we can reduce the hydrogen ions in solution by reducing those on the clay surface. This we do by liming. The lime supplies calcium which competitively replaces the hydrogen on the clay, leaving the hydrogen free to wash away in the solution and disappear.

The more the clay is saturated with calcium and the less it is saturated with hydrogen, the lower will be the proportion of hydrogen ions to calcium and other basic ions out in the solution and the higher will be the pH. In other words, the lower the hydrogen concentration the lower the active acidity.

Liming Requirements

Now the amount of lime that is necessary to replace the hydrogen on the clay to make it neutral is the lime requirement of that particular clay. Since it is the clay in any given soil which is the seat of the acidity or the seat of the hydrogen activity, the lime requirement of any soil is simply the amount of lime which is needed to give enough calcium to chase off enough hydrogen ions from close proximity to the clay to result in a clay which is predominately calcium-saturated rather than hydrogen-saturated. Therefore, one of the effects of adding lime to the soil is to increase the number of calcium ions around the clay, thereby reducing the number of hydrogen ions until such a balance between calcium and hydrogen is reached as will produce a nearly neutral soil. We know such a soil reaction will favor the growth of most agricultural plants and be specifically beneficial to our legumes. In fact, a pH near neutral is necessary for growth of certain legumes such as the very important soil building sweet clovers and alfalfas.

If we put a lot of potassium fertilizer on a soil high in montmorillonitic clay, which is rather acid and contains quite a few hydrogen ions, the clay will absorb or pick up and hold in close proximity quite a large amount of this newly added potassium. This potassium will be temporarily held with such tightness that not all of it will be immediately usable to the growing crop. It will take some time, in fact probably several years, for it to leak back gradually into the soil solution. Some scientists propose that the efficiency of the potassium fertilizer could be increased by keeping the soil limed to a suitable point so that quite a few of the exchange positions of these clays would be satisfied with the calcium from the lime and thus keep the soil from being so potassium hungry.

Adding enough lime to bring the soil close to a neutral pH produces another hidden effect. It increases the availability of phosphate fertilizers. It is known that under acid conditions iron is more soluble. It is also known that in solutions where iron is soluble, superphosphates and the phosphates in mixed fertilizers will react with the iron to form iron phosphates which are much less available to plants than the various forms of calcium phosphate. Consequently, keeping a soil near neutral by liming makes phosphate fertilizer more efficient. One must be careful not to overlime, however, because if the soil gets on the alkaline side of the neutral point it is difficult for plants to get the phosphate as efficiently as they would with the soil reaction on the slightly acid side. This is because the tri-calcium phosphates which predominate in soils where the pH is above 7 and where there is plenty of calcium available are difficult to get into solution.

Indirect Liming Benefits

Lime has another value often overlooked. In conjunction with organic matter it apparently contributes to the formation of good soil structure. Good structure occurs when the soil is well granulated, that is, when the clays are aggregated rather than dispersed and run together. When the clay of a soil is dispersed it will be puddled and in poor physical condition.

Another indirect beneficial effect of lime is its influence upon microorganisms in the soil, particularly the beneficial kinds. Most beneficial microorganisms flourish when the soil is near neutral. The legume bacteria are particularly sensitive to acidity and flourish only in soils which are sweet, that is, near neutral in reaction. One of the main reasons why sweet clover and alfalfa are so difficult to grow in acid soils is that they will not grow unless inoculated with the proper bacteria. Obviously if the bacteria will not grow in an acid medium and if those bacteria are necessary to the growth of the plants, the plants will not grow if the soil solution is acid. Other legumes like red clover and soybeans which are tolerant to acid soil will grow without inoculation and will get this nitrogen from the soil without the help of bacteria, if necessary. However, such plants ordinarily will not do as well without the proper legume bacteria.

Thus we see that when we lime a soil its beneficial action is due to many things. It is due to many complicated effects which influence each other so that their total effect is greater than would be the sum of their individual effects. It is a case of $2 + 2 = 5$. By way of summary, calcium from lime goes to clay particles helping drive off some of the hydrogen, raising the proportion of calcium and other basic ions held in the highly attractive force area around the clay particle. This results in a less acid soil. In other words, liming the soil raises the pH and neutralizes the acidity. When this is done most of our plants grow better. This may be, as some scientists claim, because the hydrogen ion is harmful to these plants. By lowering the amount of active hydrogen in the soil we therefore get rid of this harmful effect. However, many other hidden effects come in as we have described. Calcium is a nutrient element very necessary to plants. When you put lime on the soil you increase the amount of calcium in the clay and consequently the amount of soluble calcium in solution

(Continued on page 144)



Tailing dikes of Magma Copper Co. are visible in the background, behind the town of Superior, Ariz.

CONTROL OF TAILINGS FROM WASHING PLANTS

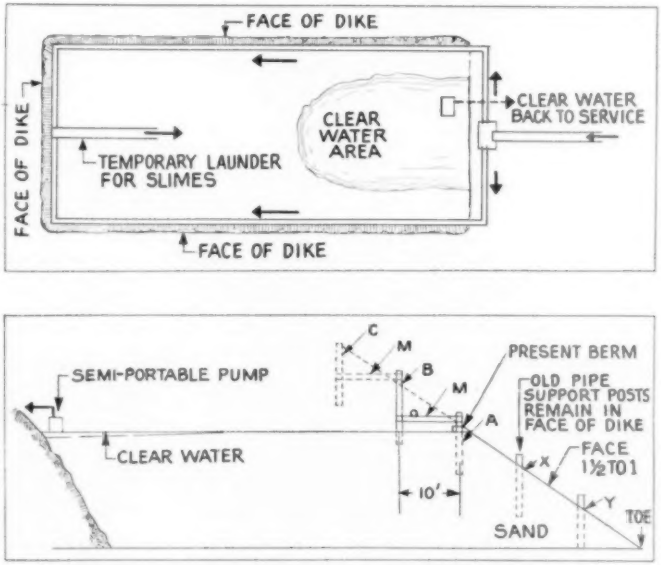
Part V: Operation of Magma Copper Co., Superior, Ariz., features use of asbestos-cement pipe sections to provide flexible, and easily moved, disposal line to tailing pond

By WALTER B. LENHART

THE OPERATIONS of the Magma Copper Co. are at Superior, Ariz., about 68 miles east of Phoenix on U. S. Highways 60 and 70. It can be reached from Globe or from Phoenix. Its production is from an underground mine from which 1400 tons of relatively high grade copper ore (6 percent Cu) per day are treated. The vein material is highly siliceous with the gangue minerals mostly quartz, quartzites, and diabase. The dry solids in the tailings have a specific gravity of 2.80. The ore is ground in ball mills with Akins classifiers in closed circuit with the grinding units, after which the copper minerals are recovered by flotation. A screen analysis of the tailings for a year's average was 96.4 percent minus 65-mesh, and 61.8 percent minus 200-mesh. Yet from this relatively fine material tailing ponds have been built using the solids from the grinding circuits entirely. Stacking of tailings here started in 1913 and to date three piles have been built, only one of which is in current use.

The height of the various piles can be gauged by comparison with buildings in the vicinity. When a pile grows to such a height that it cannot be filled by gravity, it has been the practice to build a new one. The company built its first pile nearest the mill.

The tailings flow to the disposal site by gravity and the pond now in use is lower than the two previously used. The present pond is roughly 1000 ft. long by 500 ft. wide; 25 to 33 percent of this area is clear water derived from the settling out of the solids in the mill pulp. The general technique here is the same as at the other installations previously discussed, namely, to have the sand part of the pulp deposited at the outer rim of the pond and to have the slimes flow back towards the settling area. Here the clear water is returned to the mill by a semi-portable pick-up pump. Storm water can drain over a spillway near the back end of the pond, which is on solid ground. No thickeners are used ahead of the tailing pond, though it was estimated



Plan (top) and elevation (bottom) of the Magma tailing disposal area

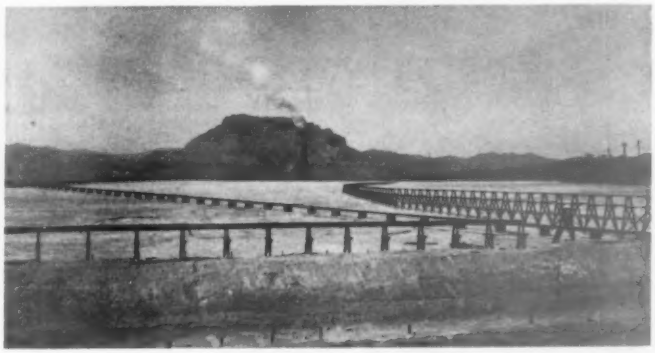
that if any such units were used it would require the equivalent of four 100-ft. thickeners to get a clear water overflow. The pulp going to the pond is 20 percent solids.

No settling reagents are added; however, in the grinding circuit (as a flotation aid) lime is added at the mill. The pH of the pulp is kept at 11.7, but there is some oxidation thereafter of the iron pyrite in the tailings which may lower this value at the pond somewhat.

Pipe Lines

The flow of tailings going to the pond (and near the pond) is split into two parts, each half going about half way around the pond. The pipe line used here is a 7-in. Transite pipe (asbestos-cement pipe manufactured and trade marked by Johns-Manville) carried level around the pond and horizontal to the berm. It is seldom higher than 4 ft. The flow of pulp in the pipe is due to the hydrostatic pressure developed in water-tight drop-boxes similar to those described in connection with the operations of the Inspiration Consolidated Copper Co. The velocity of the pulp in these lines is calculated to be 3½ ft. per sec., and the hydraulic calculations based on water. Transite pipe for this type of work does not scale, so the friction factor is relatively constant.

The velocity of the flow of pulp in the line automatically adjusts itself to changes in volume, for as the volume from the mill increases, the head developed in the drop-boxes rises and gives an increase in velocity. Conversely, a lowering of the tonnage of pulp means a lowering of the head in the drop-box, with a slowing-down of the velocity. As the pulp slows down in the horizontal pipe around the berm, it may sand up for a part of its cross section which in turn raises the head in the drop-box, and this again returns the velocity to a higher figure until equilibrium is reached. The use of drop-boxes and a slightly oversized pipe line is a clever idea, especially when the berm is level and the pipe line kept level and close to it. By splitting the line into two equal legs flexibility is further added to the system; if any trouble does develop anywhere it can be taken care of easily.



Top of the dike, showing the extensive piping

No wear in this type of pipe is noticeable after 2½ years of use. This may be due in part to the previously discussed automatic equilibrium adjustments in the flow, for at the velocities given there may always be a bed of sand in the bottom of the 7-in. line that could take up the wear on the pipe itself. The Transite pipe lengths are about 10 ft., and these have been connected together by two simple flat metal bands, one on each pipe end, with a piece of heavy roofing paper used as a gasket. Where the pipe line makes a turn, elbows are made in the company's shops out of sheet metal and the Transite pipe inserted into these units. In several places in the line a rubber sleeve about two feet long has been inserted. These permit the line to be bent slightly without shutting down the works, and they can help take care of any expansion or contraction. If a piece of the light transite pipe should be broken near the end it can be sawed off square and the loss in footage made up for by one of these rubber sleeves, should it be so desired.

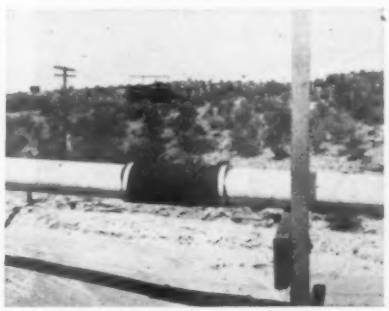
Discharging Pipe Line

The Transite pipe line is unloaded just inside the berm through 1¼-in. holes bored in the pipe. To take up the wear on this orifice, short rubber nipples are inserted in the openings similar to the practice at Inspiration. The holes are spaced on about 10-ft. centers midway between each bent that supports the pipeline. The bents are about 10 ft. apart and the ledger of each also is about 10 ft. long. The outboard end of the 7-in. pipe line is always kept open.

In operation about 30 of the plugs closing the rubber orifices are pulled in a given sector and the pulp discharged to the berm area through them. In this operation, there is a definite classification of the sand-slimes in the pipe line itself, so that a high percentage of sand discharges out through these ports, and the slimes flow onto the open end of the 7-in. pipe. At that point the slimes are picked up by a temporary launder about 20 ft. long and carried over the berm area, from which they flow back



Two flat lightweight iron bands with roofing paper underneath are used to connect the 7-in. pipe line sections



An occasional rubber sleeve is inserted in the line, making it possible to bend the line slightly



Elbows are made of steel pipe welded in the shop. If a pipe section breaks, it can be sawed off and a rubber sleeve inserted



The row of steel drums at the toe of the dike at left was placed to protect the dike from rain water that could flow between the toe and the railroad track. The rows of posts on the side of the dike once supported the pipe line



Clear water from the tailing pond is removed by a semi-portable pump, the discharge line of which goes up the face of an old dike. Note break in the face of the abandoned dike



An emergency dike is being built up by the pipe in the background. Short launders carry the pulp from the outlets over the berm

to the settling pond. This launder thus protects the berm from excessive washing.

Pipe Line Supports

One other feature that makes the tailing control methods of the Magma Copper Co. unique is the type of bents used to support the 7-in. Transite pipe line around the berm. The posts are rough 4 x 4's. The cross piece is a 2 x 8, also rough. Bolts are used throughout for connecting the 10-ft. ledgers to the posts and all the holes are prebored. The slope of the face is kept at 1½ to 1. The design of the trestle assembly is such that the post now in use on the inside (the taller post) will, as the pile grows, eventually be the post used on the outer edge of the berm.

By referring to the drawing it will be seen that post B would now be about 10 ft. inside the berm, and that the horizontal ledger connects with the top of post A. When the pile has grown the post C will be in service, which will be connected to post B. Thus the only lumber not recovered and re-used are the posts. No walkway of planking is used on this set-up and the pond operators use a small path just below the berm. Obviously no mechanical equipment can be used to build up the outer edge of the berm, so it is hand shovelled. Production tonnages, size of pond, etc. are such here that the pipe line has to be raised about every three months, which takes three men 7 to 10 days. Years ago, it was said, this operation used trestles up to 30 ft. high; with such a line it took skilled labor several months to raise it. Now most any one can raise the present line. The tailing pond operation uses one man per shift for two shifts, but on the graveyard tower (shift) the mill boss goes down and takes a look at it occasionally.

The present tailing pond is roughly rectangular with the short dimension against the higher ground. The sands make up the dike on the other three sides.

Tailings are impounded here because of a state law in Arizona and because water has to be pumped—some of it 11 miles. The mill now in use is about two years old. The mine has a depth of 4800 ft., and as some of the lower levels in the mine are in relatively hot areas, a $2,000,000 Anaconda-type cooling system has been installed. Copper concentrates produced in the mill are piped across one of the older tailing ponds a distance of a mile or more to the company's smelter, where the concentrates are filtered and smelted.

The offices of the Magma Copper Co. are at Superior, Ariz. W. P. Goss is vice-president and general manager. H. J. Rex is concentrator superintendent, F. T. Davis is metallurgist, and Jerry Chilton is secretary to the manager.

ESTABLISHING RESPONSIBILITY FOR DUST

Evaluation of dustfall measurements through scientific analyses considered from standpoint of protecting plants against claims and to aid in overcoming nuisance

By R. R. PAXTON*

IN A PREVIOUS PAPER (4) the author described the greased plate method for measuring dustfall rate. The object of this paper will be to bring out ideas that are useful in the interpretation of dustfall measurements.

Examination of Dust Plates

The greased plate method of dust collection has the advantage that the dust is retained in its original state. It is not a sludge in the bottom of a water-filled jar. The heavier dust particles do sink into the grease layer, however. This is particularly noticeable when the plates have been exposed on hot, sunny days and when an excessive amount of grease has been used.

As soon as the plates have been brought in from the test stations they should be inspected. Tabulated below are common observations and their likely causes:

Observation	Likely Cause
Long, narrow clear streaks	Plates poorly greased
Clear strip along each edge	Grease removed in sliding plates into carrier
Irregular rounded areas in which the dust appears particularly dense	Birds landed on plate, probably to feed on captured insects. Dust is from the birds' bodies and wings
Relatively coarse sand or grit on plates	Tampering
Clear, circular spots, blisters in coating.	Rain drops spattered or, lifted grease.

Microscopic Examination

Inspection of the dust plates under low power microscope will show the size and shape of the dust particles. The diameter of small particles is usually expressed in microns. A micron is 1/1000 of a millimeter or 1/25,400 in. For orientation, Table I has been prepared listing the approximate dimensions of common small items.

Particle size and shape are important because, along with the particle density, they fix the particle's settling rate in quiet air. Knowing the rate at which a particle falls through the air, one can compute how many hours it should take that particle to fall from a given height, the top of a smoke plume for instance. If one knows the number of hours it takes a particle to fall from the smoke plume to the ground and in addition the velocity of the wind is known, one can compute how far that particle would be carried before it reached the ground. Thus for a particular particle size and wind velocity, one can compute how far downwind a given stack should throw dust.

Table II lists the settling rates of spherical particles in quiet air. Take as an example a 40-micron sphere falling from a 300 ft. height and carried along in air moving at 5 m.p.h. To fall 300 ft. would take ¼ hr. Traveling at 5 m.p.h. for ¼ hr. the particle would first strike the ground 1¼ miles downwind from its release point.

Unfortunately the behavior of dust clouds is not quite this simple. Turbulence in the atmosphere has a profound effect upon their rate of subsidence. Baron, Gerhard and Johnstone (1) have recently considered this problem in some detail. Topography is another major variable which is difficult to treat quantitatively. Probably of lesser importance is the effect of stack temperature, particle shape, particle agglomeration, and the variation of wind velocity with elevation. The usual net effect of all these factors is to increase the distance which a given particle will travel before it falls to the elevation of the test plate. In any real case these and other variables must be weighed, nevertheless the earlier described computation can serve as a useful guide in estimating the probability of a particle having originated from a given source.

Many times the particles from a given stack will have a distinctive color, shape, or crystalline structure. Under the microscope the material captured on the greased plate can be compared with that leaving the stack in question. This approach could be used to locate the origin of dust within a cement plant. There might, for example, be uncertainty as to whether the dust originated from the kiln stack or from the clinker processing equipment. Since the material from either would have substantially the same composition, chemical analysis could go no further in locating the origin. Under the microscope, however, the clinker dust would have a unique crystalline structure. Microscopic comparison of the captured dust with the two generated dusts would then leave no doubt as to which portion of the plant needed further dust control equipment.

Weighing Dust

If the plant in question is a considerable distance from the nearest other dust producer, the rates of dustfall at the various test stations will go a long way towards telling whether the plant is adding significantly to the rate. The distant or control stations will report the background rate, that

Table I. Approximate dimensions of common items (2) (5)

Item	Dimensions Microns (Mu)
Raindrop diameter	4000-100
Human hair diameter	200-40
Limit of visibility of the human eye	40-10
Cement dust	40-5 (?)
Silica dust	10-1
Ammonium chloride fume	1-0.1
Wave length of visible red light	0.7
Tobacco smoke	0.2
Large molecules-diameter	0.005
Interatomic distances in molecules	0.0001-0.0003

Table II. Settling velocity for spherical particles* in quiet air†

Particle diameter				Particle weight	Rate of fall	
Microns	Equiv. Tyler mesh			Milligrams	Feet per hr.	Microns per sec.
100	−150	+	170	0.008	7,600	640,000
40	−325	+	400	0.0005	1,200	103,000
20				0.00007	290	24,000
10				0.000008	72	6,100
5				0.000001	18	1,550
1				0.000000008	0.8	70

*Particle specific gravity (not bulk density) assumed twice that of water.
†Based on the Stokes-Cunningham Law.

*Department of Chemistry, Stanford University, Stanford, Calif.

is, the rate that would be expected in the area were the plant not in operation. If the stations nearer to the plant indicate rates consistently above the background rate, it is likely that the increase is due to the plant. This line of reasoning presumes that there is no other unusual dust producing activity near the plant, a presumption that is rather difficult to verify.

Ignition Loss Determinations

To reduce the uncertainties of the above method, one may examine the dust by chemical as well as by the earlier described visual methods. The simplest chemical test is a determination of the weight loss of the dust upon ignition at 950 deg. C. The determination is generally made on a sample that has been oven dried at 105 deg. C. to eliminate its free water. The ignition step burns off all organic matter. It also removes chemically bound water as in $Mg(OH)_2$, and bound CO_2 as in $CaCO_3$. Compounds of arsenic, ammonia, and even potassium may be volatilized. In the usual sample these latter ingredients are not present in significant amounts. Most samples also have low calcium and magnesium contents. Where these conditions hold, the ignition loss generally indicates the fraction of organic and carbonaceous material in the dust.

At certain times, generally in the spring, the greased plates will capture a large amount of pollen and insects. The pollen in particular is not readily distinguishable from dust. It is not uncommon to have a pollen rate of fall up to 0.8 lb./acre/day. This pollen fall is superimposed on the *natural* dustfall rate which commonly varies from 0.4 to 2.0 lb./acre/day depending upon location and season.

Chemical Analyses of Dusts

Often one needs quantitative data on the fraction of dustfall that has come from a given source. If the composition of the emanated dust differs markedly from that of background dust in any way, chemical analyses of the dust samples offer the best approach to meet this need. By comparing the analysis of the captured dust with that of the emanated dust and that of the background dust, one can compute the fraction of the captured dust which is background. Thus the dust captured at each station can be resolved into a background and an emanated portion. The application of this method to cement dust-background dust mixtures has been described by Mitchell (3).

This technique can be easily expanded to resolve the dust into three fractions, providing again each of the dusts have known and different compositions. To do this requires an analysis for a minimum of two elements in each of the three sources and in the captured dust. Analysis for additional elements will permit independent checks and greatly strengthen faith in the results. There follows an illustrated example of this technique using typical data.

Table III presents chemical analyses of three dust samples. Station 12 is the station of interest, while Station 1 is a distant control station. The third set of data was obtained on a sample of dust filtered from the stack gas. In this instance, the dust captured at Station 12 was first thought to be made up of background dust plus stack dust. Station 1, being distant from the plant, is assumed to have captured unadulterated background dust. The problem is to ascertain how much of the dust at 12 was stack dust.

Table III. Sample dustfall data for cement plant environ

	Station 1	Station 12	Stack Dust
Distance from stack, mi.	10	1	—
Dustfall rate, lb./acre/day on an oven-dry (105 deg. C.) basis	0.8	2.2	—
Analysis on an oven-dry (105 deg. C.) basis:			
Percent Ignition loss	30	42	31
Percent Ca as CaO	6	22	41
Percent Si as SiO_2	47	20	9

At first glance, one would be inclined to say that stack dust was falling on 12 at the rate of 2.2-0.8 or 1.4 lb./acre/day. This is wrong. It is wrong because it incorrectly assumes the dust on 12 came only from two sources. The proof of this error can be shown by examining the ignition loss figures. No mixture of stack dust and background dust could give an ignition loss of 42 percent. Sample 12 must have become contaminated with a high ignition loss component. A recheck of the field notes brought out the fact that 12 was adjacent to a blossoming orchard. Thus it is probable that it received an unnaturally high amount of pollen. Station 12 was in reality receiving dust from three, not two sources.

Lacking an analysis for pollen, one can only assume it is substantially all organic and hence would show 100 percent ignition loss. The problem is now to resolve Station 12 dust into three components: stack dust, pollen, and background dust. Taking as a basis for our calculations the amount of dust falling on an acre in a day, let

p = lb. of pollen
s = lb. of stack dust

then 2.2-s-p = lb. of background dust

The ignition loss of the captured dust may be expressed as:

$$2.2\ (0.42) = p\ (1.00) + s(0.31) + (2.2\text{-}s\text{-}p)\ (0.30)$$

The CaO content of the captured dust may be treated in a like manner. Solving the two simultaneous equations for s and p, one finds

s = 1.07 lb. stack dust
p = 0.36 lb. pollen

leaving 0.77 lb. background dust for a total of:

2.20 lb. dust at Station 12.

Note that the computed rate of background dustfall closely checks the observed rate at Station 1.

These computations have made use of the ignition loss and the CaO data. So far no use has been made of the SiO_2 analyses. Accordingly these can now be used to make an independent check on the above computations. Let us solve for the percent SiO_2 that would be produced by adding together stack dust, pollen, and background dust in the above proportions, and then check this computed percent SiO_2 against the observed percent SiO_2. Using the above equation:

$$2.2\ (\text{percent } SiO_2) = 0.36\ (0) + 1.07\ (9) + 0.77\ (47)$$

$$\text{percent } SiO_2 = 20.8$$

The computed percent SiO_2 differs little from the measured 20 percent. Thus the data are consistent and can be accepted as probably correct.

The above example demonstrates how chemical analyses can be used to separate captured dust into its several components. By this method one obtains a rather exact estimate of the contributions of each source to the total dustfall rate. With slight modifications this method could be used to resolve dust into more than three components.

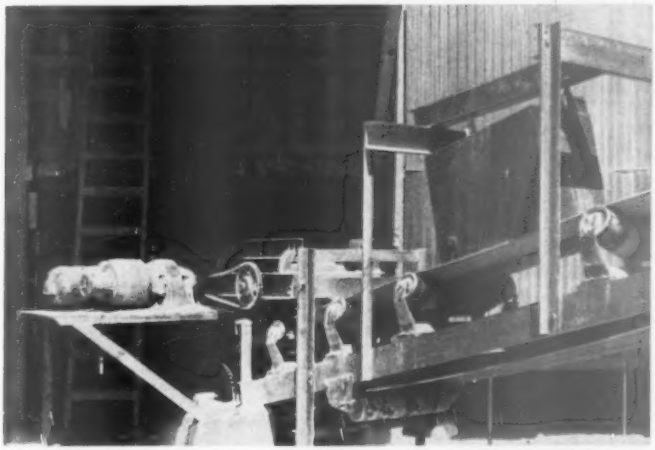
Public Relations Aspects

This and the preceding article have considered the dustfall aspect of atmospheric pollution. Viewed as a whole, it shows the plant operator how to find his contribution to the overall dustfall rate. The treatment would not be complete, however, without a few words on the public relations aspect of the problem.

Dust-producing plants originally located in an isolated, sparsely settled area frequently find themselves now amid a rapidly growing community. The residents of this community want to know that the plant is not indifferent to the dust problem. They will not be put off by being blandly told that there is no dust problem, neither will they accept the common excuse that theirs is an industrial community and dust is just inevitable. They must be told of the unsolved technical problems and of the very high costs involved. Above all, the company must show

(Continued on page 144)

Nevada plant of Eagle-Picher Co. produces multiple products down to micron sizes and calcined product for chemical, industrial and insulation uses



At the left is a belt drive that operates belt-type feeder. At the right is stationary magnet over conveyor

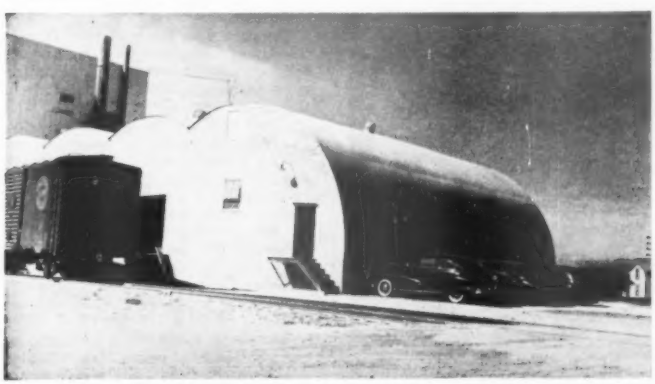
PRODUCTION OF DIATOMACEOUS EARTH

DIATOMACEOUS EARTH is of particular interest at this time to the aggregate and portland cement industries, and to all producers of concrete aside from the wide variety of established uses for the product. In reviewing the general subject of opaline rocks it will be found that they are, at the moment, occupying a great deal of attention by concrete engineers and technologists because of the belief that opaline rocks, when present in hard aggregates, combine too readily with the alkali portion of portland cement. The result is a silica jel, which, because of its increased volume, disrupts (by expansion) the concrete. It also is maintained that a relatively small amount of opaline rocks in the aggregates, and in combination with high-alkali cements is not to be desired, but that a larger amount is not harmful.

So the modern thinking, if the aggregate contains a small amount of reactive materials (opaline rocks), is to add enough opaline material from other sources to bring the content of the mix above the "pessimum" requirements. Advocates of this plan are of the opinion that, as the additive is finely ground and contains a high percentage of opaline materials, the harmful reaction between the cement and the additive takes place almost instantly or while the concrete is in the early setting stages, so that no harmful results can occur in the set concrete. One possible additive is diatomaceous earth.

Diatomaceous earth is a western product and no commercial deposits are known east of the Mississippi. California and Nevada are the principal producer states, according to Bureau of Mines data.

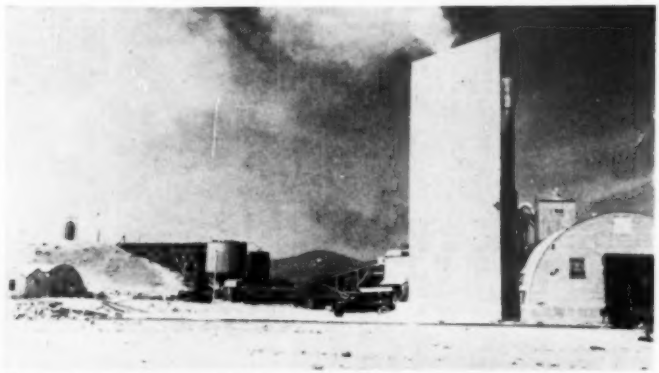
About 20 miles east of Reno, Nev., on U. S. Highway 40, the Eagle-Picher Co. has opened up a huge deposit of high-grade diatomaceous earth. It is estimated that there are several million tons of crude diatomite at that location. At Clark, on the rails of the Southern Pacific railroad, the company has built a modern grinding, cal-



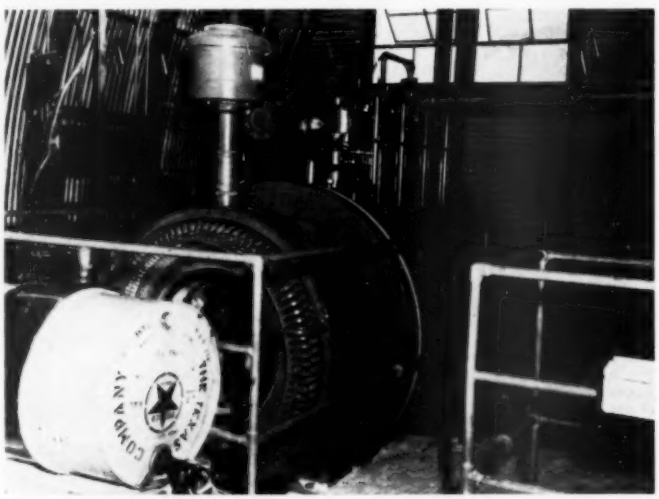
These Quonset-type warehouses provide some 17,000 ft. of storage space



This ¾-cu. yd. shovel is a fast unit and gets out a large tonnage



The silo at left receives raw material from the pit. Below it are the slugger rolls and offbearing conveyor belts. The main part of the grinding mill is the tall, thin structure



Three of these 125-kv.a. diesels are each directly connected to a generator



Some 14,000,000 tons of diatomaceous earth have been mapped out at Clark's Station mine. This exposure has been stripped and is now being excavated

cining and processing plant. The deposit is seven miles from the plant with the two operations connected by an oiled road built by Eagle-Picher.

The Product

The company markets its material under the trade name "Celatom." The diatomaceous earth from which Celatom is made is a white, hydrated silica which is almost pure. Being practically all silica, the material is quite inert and amorphous in structure. The genesis of diatomaceous earth reaches back several million years when vast seas and fresh water lakes covered what is now mostly desert land. In these waters flourished a microscopic uni-cellular plant called the diatom or diatomaceae. The plants were so small that 50,000,000 of them occupied a cubic inch. Diatoms absorbed silica from the water for shell protection. Their life span was brief and the rate of reproduction enormous. In certain areas these tiny skeletons settled into vast beds and eventually became fossilized. These uplifted deposits later leached, dried, and today are the sources of diatomaceous earth.

The material, after processing, is very light in weight and will run from four to ten lb. per cu. ft. It will readily absorb several times its weight in water or oil. The quarry-run material contains around 45 percent moisture; the air dried material contains close to 25 percent. At the Clark operation, Celatom is processed in sizes from minus ¾ in. down to fine powders that have an average particle size of five microns. In the plant there is a 7- x 65-ft. rotary kiln that is operated as an indirect heat dryer. The dried material from this unit will have water in the 3-percent range. For other uses, the material is calcined at higher temperatures in a 7- x 75-ft. fire-brick lined rotary kiln. Both kilns are oil fired.

Calcination reduces the shrinkage when the material is used for high temperature brick work. It also reduces the water requirements when the material is used in concrete work.

Temperatures are controlled from a panel that features controlling and recording potentiometers. This instrument insures a quality product, one that is not over- or under-treated. The calcined material is delivered to the packaging hoppers by means of an air-lift cyclone collector and rotary lock. The material going to the dryer is transferred via a bucket elevator with a rotary feeder at the top to seal off the elevator from the dryer. A somewhat similar arrangement is used for conveying the material from the discharge end of the dryer.

Plant Description

The plant is laid out to produce two general classes of material. One is natural Celatom from a coarse aggregate (¾ in.) to a minus 325-mesh product.

(Continued on page 136)



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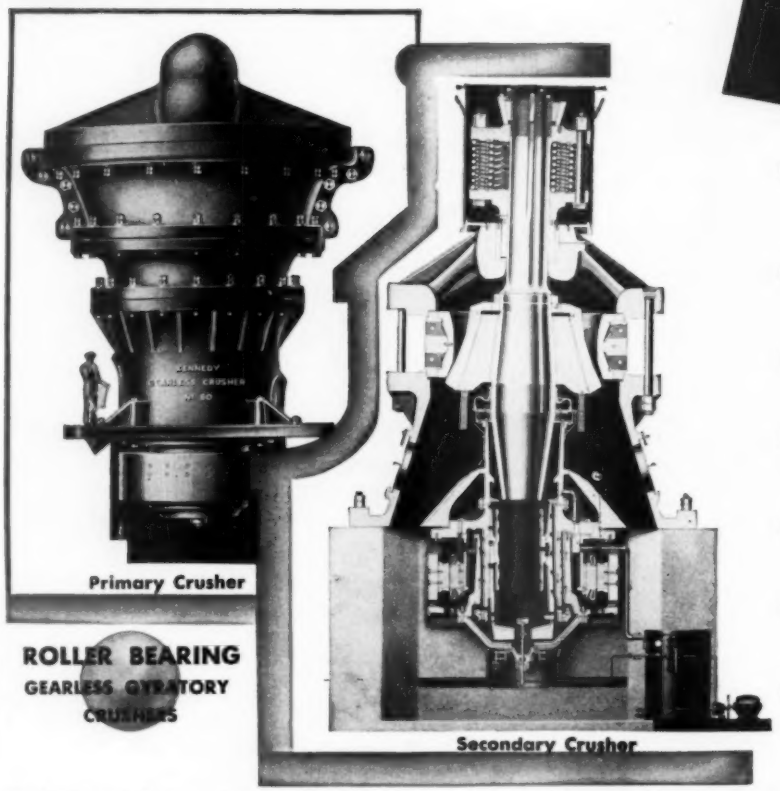
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The 4" slurry pump pictured is the famous Georgia Iron Works slurry. These pumps are made in sizes from 2" to 14".

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You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

1 **AIR COMPRESSOR DRIVES**—Electric Machinery Manufacturing Co. has released a new issue of the E-M Synchronizer, No. 32, which illustrates and describes motor drives for all types of large air compressors. The 24-page booklet contains a technical discussion of "P_f," "Synchronizing Power," as well as tables, charts and graphs for matching motor characteristics to compressor requirements.

2 **ARTIFICIAL RESPIRATOR** — Mine Safety Appliances Co. has released a 4-page bulletin, No. CH-2, covering its Pneolator, which is said to make possible automatic artificial respiration without suction. Compact and lightweight, the Pneolator is contained in a Fiberglas carrying case. Photographs are included in the bulletin.

3 **BELTING**—Thermoid Co. has published a 16-page bulletin, Form No. 3679, describing and illustrating all types of conveyor and elevator belting. The booklet contains a discussion of each of the various types of belting, and is complete with tables, charts and formulae for selection and application.

4 **CEMENT HANDLING**—Mann Engineering Co. has issued Bulletin FM-1, describing and illustrating methods of handling and storing bulk cement in ready-mix, pre-mix and structural concrete plants. Clearly labeled diagrams are included in the release.

5 **CHAINS** — Jeffrey Manufacturing Co. has announced Catalog No. A418, covering its line of chains and sprockets for new and replacement service on elevating and conveying equipment, and for drives. Particular emphasis is given to drive chains with necessary information to simplify selection.

6 **CHEMICAL PLANT**—Kaiser Aluminum & Chemical Sales, Inc., Chemical Div., has issued a reprint of an article which describes its integrated chemical-basic refractory plant. Photographs, diagrams and detailed factual information are included in the bulletin, which is said to be useful to consumers of refractories and chemicals in the metallurgical and other chemical process industries.

7 **CLAMSHELL BUCKETS** — C. S. Johnson Co., Koehring Co. subsidiary, has prepared an 8-page catalog, describing and illustrating three types of clamshell buckets in sizes from ⅜ cu. yd. to 2½ cu. yd. A full page is devoted to a complete table of condensed specifications, including capacity, weight, dimensions and sheave and cable data. Action photographs are shown along with a summary of the manufacturer's line of concrete batching and cement handling equipment.

8 **CLARIFIERS**—Hardinge Co., Inc. has announced publication of a 4-page bulletin, No. 30-B, covering its line of sand filter-clarifiers, which are not the backwash type but employ spiral scrapers. Operating principles, typical performance data, capacities and diagrams are included.

9 **CONCRETE SLABS**—The Flexicore Co., Inc. has issued a catalog describing and illustrating Flexicore prestressed concrete floor and roof slabs. Special features include a simplified load chart, diagrams showing construction usage, installation and complete specifications.

10 **CONTROL EQUIPMENT** — Richardson Scale Co. has issued a bulletin describing and illustrating its various precision units. The proportioning, blending and process control equipment include scales of the "pre-weighing" type, which refers to the delivery of prescribed amounts of material. The bulletin gives several examples of installations of complete systems.

11 **CONVEYORS**—Barber-Greene Co. has announced the publication of Bulletin 382, containing detailed information on its portable belt conveyor. Sketches and photographs show applications and machine design features, as well as other conveying and car-loading equipment.

12 **CONVEYOR BELTS**—The B. F. Goodrich Co. has issued a 28-page catalog section, No. 2200, illustrating and describing its line of conveyor and elevator belts, hot material conveyor belts, food handling belts, etc. The publication covers all belt features, including construction, maintenance and function.

13 **COUPLINGS**—The Falk Corp. has released a 6-page bulletin, No. 4115, illustrating and describing piloted type couplings, which support long shaft extensions or floating shafts. Construction features, cutaway views, complete dimensions, and typical applications are included.

14 **CRANE-EXCAVATOR**—American Steel Dredge Co., Inc., Wayne Crane Div., has published a 14-page catalog, describing and illustrating in color its heavy-duty line of ½-cu. yd. crane-excavators; crawler, truck and wagon. Complete specifications and operating data are included.

15 **CRANES**—American Hoist & Derrick Co. has released a 24-page catalog, No. 400-R-2, describing and illustrating revolving cranes for the heavy construction industry. A table of rated lifting capacities and photographs of major damsites are shown.

16 **DIESEL ENGINES** — General Motors Corp., Detroit Diesel Engine Division, has announced a catalog, describing its line of Series 71 2-cycle diesel engines, for application in the industrial, petroleum and marine fields. The book covers single and multiple engine units from 2 to 24 cyl. with power ranging from 32 continuous to 780 intermittent hp., and includes engine illustrations and outlines of the division's service facilities.

17 **DUST CONTROL**—Pangborn Corp. has brought out a 50-page, digest-size book on dust control technology. The book, "Industrial Dust Control Through Exhaust Systems," illustrated with 15 photographs and 10 line drawings, covers, in three major sections, (1) exhaust hoods and piping systems, (2) dust collecting equipment, and (3) exhausters and drives. A detached problem sheet is included on which the reader can enter data particular to his case, and which the dust control engineer utilizes when working out system details.

18 **DUST RECOVERY**—Western Precipitation Corp. has published Bulletin C-117, describing installations of both Cottrell and Multiclone equipment made in various dust-recovery applications. Although the bulletin particularly features applications in cement and rock crushing plants, much of the data is pertinent to other fields where dust recovery is a problem.

19 **EARTHMOVERS**—The Baker Manufacturing Co. has announced the publication of an engineering bulletin, No. 894, describing and illustrating its new, larger, engine-mounted hydraulic bulldozers, gradebuilders and root rippers, manufactured to match the Allis-Chalmers HD-20, HD-15, HD-9 and HD-5 tractors. Descriptions of the new design, performance features and specifications are contained in the booklet.

20 **ELECTRODES** — Harnischfeger Corp., Welding Div., has issued a 56-page, pocket-size, electrode guide, describing various classifications of electrodes, and including a 2-page comparative chart which lists corresponding types. The booklet also indicates typical applications and available sizes.

21 **EQUIPMENT OPERATION** — Caterpillar Tractor Co. has announced the availability of a 32-page handbook, Form 30061, prepared especially for heavy equipment operators, which describes and illustrates, in comic book style, the operation of bulldozers, scrapers, rippers and cable controls. Additional material includes information on high speed hauling and loading.

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22 FEED WATER CONTROL — Bailey Meter Co. has issued Bulletin 105-C, describing and illustrating its three-element feed water control. The 16-page bulletin contains a discussion of problems and solutions in feed water control. Diagrams, cutaway views, typical chart records and photographs of installations are included.

23 FLEXIBLE COUPLINGS—Link-Belt Co. has announced the availability of a 4-page illustrated folder, No. 2363, describing roller chain flexible shaft couplings. Engineering information for proper application includes dimensions, weights, service factors and horsepower ratings.

24 FORK TRUCKS — The Baker-Raulang Co., Baker Industrial Truck Div., has released an 8-page bulletin, describing and illustrating the design and construction features of its FT fork trucks in 3000- and 4000-lb. capacity. Detailed specifications, dimension drawings, applications and recommended maintenance procedures are included.

25 GENERATORS — Electric Machinery Manufacturing Co. has published a bulletin, No. 2100-PRD-202, describing and illustrating installation and operation of "packaged" generators, which are said to deliver electric power at constant voltage without accessory switchboard equipment. Charts, graphs, power factor tables and electrical information are all given in detail.

26 HYDRATORS—Hardinge Co., Inc. has published an 8-page catalog, Bulletin No. 49, describing its new continuous lime hydrators. The bulletin covers the theory of lime hydration, as well as construction details, photographs, diagrams, dimensions and capacities.

27 INDUSTRIAL LUBRICANTS—The Brooks Oil Co. has issued a 24-page brochure commemorating the company's 75th anniversary. Combining both technical data and historical information, this booklet traces Brooks' history from its beginning as a lamp oil producer to its present position as a large compounder of industrial lubricants.

28 JOINTS — Curtis Universal Joint Co., Inc. has issued catalog C1 describing and illustrating engineering data on universal joints, weights, specifications, dimensions, graphs, and dynamometer tests. Also included are complete buying and ordering instructions and assembly and disassembly requirements.

29 LININGS—Atlas Mineral Products Co. has released its new corrosion proof linings bulletin, No. 4-1, describing sheet linings, solution or dispersion linings, brick-sheathings and miscellaneous linings.

30 LUBRICATION — The Texas Co. has published its March, 1951, issue of "Lubrication," a technical release devoted to the selection and use of lubricants. The subject of this 36-page issue is "Engine Oil Pressure" and many diagrams, photographs and cutaways supplement the article.

31 MANGANESE — Rankin Manufacturing Co. has released a 4-page bulletin entitled "Hard Surfacing Manganese Steel," which outlines applications, precautions and suggestions on procedure.

32 MIXERS—Kwik-Mix Co. subsidiary of the Koehring Co., has published a catalog containing a simplified method of comparing construction features, dimensions and capacities of various types and sizes of plaster-mortar mixers. The 8-page booklet contains many photographs depicting company features, along with schematic drawings listing the detailed dimensions of each machine.

33 OIL FILTERS—Caterpillar Tractor Co. has published a 16-page informational booklet, Form No. 30041, entitled "Don't Buy Trouble" and dealing with oil filters, their purpose, makeup, and the qualities to be looked for in a filter.

34 PIPE—Naylor Pipe Co. has released a 4-page bulletin, No. 507, describing and illustrating typical applications of its lightweight spiral weld pipe in the construction, dredging, materials handling, mining, oil, paper mill and power plant fields. The pamphlet includes data on fittings, flanges, connections and pipe specifications from 4 in. to 30 in. in dia.

35 POWER EQUIPMENT — The Euclid Road Machinery Co. has published two 16-page booklets, EGM-1 and ECE-10, describing and illustrating General Motors and Cummins powered Euclid equipment, respectively. Specifications for rear-dump and bottom-dump hauling units, scrapers and loaders are included, along with lists of dealers and distributors in the United States and Canada.

36 PUMPS—Lawrence Machine & Pump Corp. has issued Bulletin 250, which describes, illustrates and contains instructions for installation and operation of its centrifugal pumps.

37 PYROMETER—The Bristol Co. has published a 12-page bulletin, No. P1242, describing and illustrating the theory of radiation pyrometry and the features of the Pyrovisor radiation unit. Also included are photographs and diagrams illustrating accessories offered to adapt the unit for use with furnaces and kilns for indicating and recording and controlling temperatures up to 4000 deg. F.

38 RECORDERS——Leeds & Northrup Co. has released a revised catalog, N-27, describing new recorder equipment and tachometers. The expanded catalog discusses and compares the principles of operation of Micromax and Speedomax instruments, with sketches and photographs of installations, as a supplement to the discussion.

39 ROCK DRILLS—Worthington Pump and Machinery Corp. has announced as available Bulletin No. H-1200-B42, describing and illustrating its WJ-45 and WJ-55 hand held rock drills. Complete specifications and photographs are included.

40 THERMOCOUPLES — The Bristol Co. has published a new edition of its thermocouple and pyrometer accessories bulletin, listing additional items and containing new data on application and use of thermocouples. In the 56-page bulletin, engineering information, tables of calibration data and methods of installation are described and illustrated.

41 THERMOMETERS & RECORDERS — Wheelco Instruments Co. has published Quarterly issue, Volume 10, No. 2 of Wheelco Comments, house organ of the company. The bulletin describes and illustrates various applications of its resistance thermometers and strip chart recorders. The publication continues its policy of running an "Instrumentality in Action" column which features unusual adaptations of Wheelco equipment in industry.

42 TRUCKS & TRACTORS — Towmotor Corp. has released a standard specification folder containing data on its line of fork lift trucks, tractors and electric pallet trucks. The pamphlet gives such information as capacities, load centers, lift heights, weights, dimensions, turning radii, speeds of travel, etc.

43 WELDING—The Champion Rivet Co. has issued three publications concerning its line of welding products. This literature includes a welding electrode catalog, welding electrode comparison chart, and a cost calculator.

44 WELDING FITTINGS—Taylor Forge & Pipe Works has released a dimensional data card which gives the essential dimensions of the company's welding fittings and flanges. The information has been condensed to two sides of an 8- x 11-in. card, which is varnished for protection.

Detach and Send Us This Post Card

(6-51)

ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago, Ill.

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41	42	43	44						

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Company .....

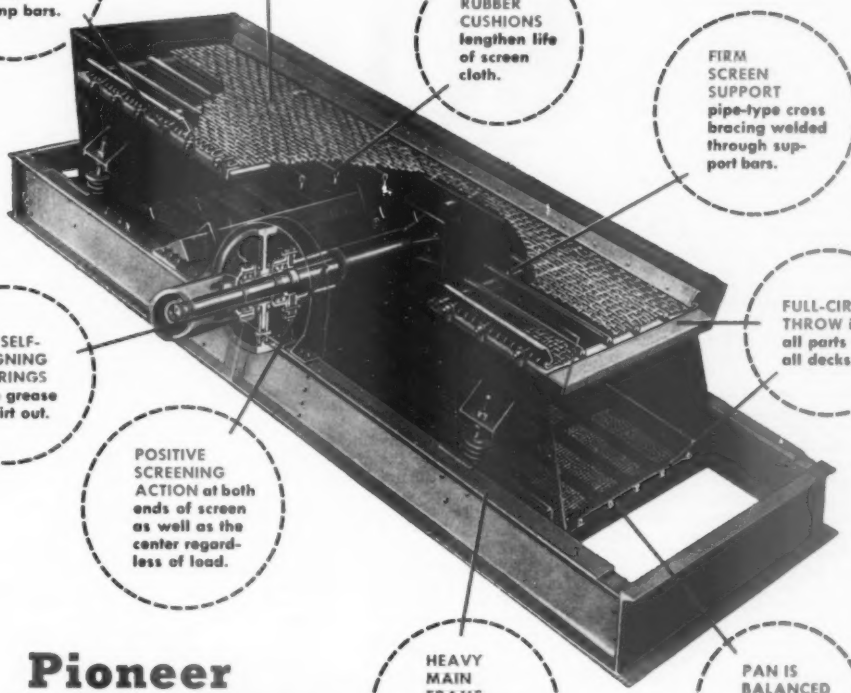
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FROM THE INSIDE OUT

To Give You the Pioneer Edge



CROWNED SCREEN spreads material, prevents sagging.

SCREENS QUICKLY CHANGED or tightened —with clamp bars.

RUBBER CUSHIONS lengthen life of screen cloth.

FIRM SCREEN SUPPORT pipe-type cross bracing welded through support bars.

FULL-CIRCLE THROW in all parts of all decks.

SKF SELF-ALIGNING BEARINGS keep grease in, dirt out.

POSITIVE SCREENING ACTION at both ends of screen as well as the center regardless of load.

HEAVY MAIN FRAME cross-braced with two plates under bearings.

PAN IS BALANCED end for end, top against bottom.

Pioneer VIBRATING SCREENS

in 3'x6', 3'x8', 3'x10', 4'x8', 4'x10', 5'x10', 4'x12' and 5'x12' sizes with two, three or four decks . . . also in tandem up to 4'x20'.

BUY BOTH! HIGHER OUTPUT LOWER UPKEEP

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1515 Central Avenue • Minneapolis 13, Minnesota

Please send me complete information about PIONEER Vibrating Screens.

Name_____

Street_____

City_____ State_____

Diatomaceous Earth

(Continued from page 130)

The only processing this product receives outside of grinding and classification is the previous drying step. All or a part of this type of product can be diverted and sent to the calcining kiln where the second type of product receives its preliminary treatment, i.e. high temperature calcination, after which it is packaged. The coarser natural aggregates can be screened on a three-deck vibrating screen to produce any desired size up to ⅜ in.

Metallic iron in the finished product has a harmful effect, so magnets are installed at several places throughout the processing plant. Permanent and electric types are used. One is installed after the primary crushing operation, one is ahead of the finish grinder, and others are placed ahead of the St. Regis packers. There are three St. Regis 105 packers in the plant and three automatic high-speed screw-type packers for the coarser sizes. Bindicators are installed where applicable throughout the plant and over the packers. The material is packed in 50-lb. multiwall kraft bags and stored in a quonset-type warehouse that has a floor area of 17,000 sq. ft. Owing to the dry climate in western Nevada, the warehouse is water sprayed from time to time to increase the humidity within the storeroom.

Primary crushing is done with a single roll-type crusher that can handle chunks of crude diatomaceous earth up to 1 cu. yd. in size. From the primary crusher the material flows to an intermediate storage bin outside the building. Material from this bin is fed to another belt conveyor serving the dryer and grinding plant. Over the belt serving the main plant a larger electric magnet is installed.

The single-roll crusher reduces the material to about ¾-in. top size. Secondary or finish grinding is done in a special mill. This type of mill has a high-speed revolving rotor that operates horizontally. Breaker bars and the rotor do the grinding and pulverizing. This is said to be a very flexible unit and one that can give a high percentage of desired fines. It is a quietly operating machine and is said to deliver microscopically small, cubed particles. From it a fan elevates the product to five counter-air-current classifiers in series with provisions for returning the oversize (¼ in.) to the mill, or pass it on to the coarse aggregate bins. Air classifiers and cyclone collectors were supplied by the Pacific Coast Engineering Co. From these cyclones the material is delivered to the St. Regis packing machine bins by "bulk flow" conveyors. With these devices, the excess materials can be returned to the source. Rotary valves are provided at the outlet of each classifier and cyclone.

In the quarry a large area has been stripped. Thickness of the overburden to be stripped varies from one to six ft. Four benches, each about 28 ft. high, have been opened up. Eventually the mining operations will be carried out from six benches. By having a number of benches from which to work, more selectivity of crude material and greater flexibility in the mining operation is possible. More drying also is a factor here, and, if necessary, blends can be made so as to keep the soluble content of the Celatom below certain limits. Minimum specifications are easily maintained at this operation.



Tom Copeland (left), manager, with Herman Jones, mill superintendent

A rubber-tire mounted portable air compressor supplies the air for blasthole drilling. Jackhammers are used for all the drilling, as the material is very soft. Thirty-ft. vertical down holes can be drilled. A box of jackbits will last about a year. Twenty percent bag powders are used for blasting. A ¾-cu. yd. Byers shovel and a ¾-cu. yd. P&H shovel are used for loading.

Uses

A considerable amount of tonnage is going to the Eagle-Picher Co. insulation plant at Joplin, Mo., where high-temperature insulation products are made. These white, extremely lightweight products are finding a wide use in furnace work as a non-load-bearing insulator. Their strengths are due to a lime-silica (Celatom) reaction in autoclaves much along the lines of sand-lime brick. Other uses for Celatom are as a conditioner for ammonium nitrate, for oil absorption, and as an ingredient for paints, paper, polishes and waxes.

Hydroelectric power is supplied by the Sierra Pacific Power Co. through a 500 kv.a. substation. The mill was designed and built by the Western-Knapp Engineering Co. of San Francisco, and went into operation in November, 1947.

Eagle-Picher's Clark operation is under the management of T. A. Copeland.

Transportation Costs

OFFICE OF PRICE STABILIZATION has issued Interpretation 1 of the General Ceiling Price Regulation, in respect to absorbing or passing along increases in transportation costs. It was ruled that increases in inbound transportation costs, incurred by the seller in obtaining delivery from his supplier, cannot be added to the seller's ceiling prices. The seller must absorb all such increases. Increases in outbound transportation costs may be passed along to the buyers under certain conditions. The following regulations have been set up to determine each case:

1. If the seller, during the base period, quoted a delivered price, he must absorb any increases in transportation costs.

2. If the seller sold at a delivered price during the base period, but such price was computed on the basis of an f.o.b. price, adjusted for the actual cost of making delivery to each individual purchaser, the seller may pass on increases in transportation costs actually incurred. However, this method of computing the base period delivery price must have been objectively established to purchasers — whether the seller offered both a delivered and an f.o.b. price, the difference being the actual transportation costs; whether the seller quoted or billed actual transportation charges separately; or whether the delivered price varied in each locality precisely by the difference in actual cost of transportation incurred by the seller for delivery to the various localities.

3. If the seller sold f.o.b. in the base period, adding on only actual transportation costs, increases in outbound transportation costs actually incurred by the seller may be passed on to the purchaser.

4. If the seller, in the base period, quoted an f.o.b. price, plus a "transportation charge," but such transportation charge did not represent the actual transportation cost incurred by the seller, then the seller must absorb any increase in transportation costs.

5. If the seller sold only at delivered prices in the base period and now desires to shift to f.o.b. prices, the seller must reduce his ceiling prices by the amount of each purchaser's actual freight cost.

Safe-Driving Awards

STEWART SAND AND MATERIAL CO., Kansas City, Mo., through its Safety Club, has presented safe-driving awards to 49 men, all of whom had accident-free records of six months or longer. Eight of the 49 have a 5-year accident-free record.

Adds Washing Plant

CUERO SAND AND GRAVEL CO. recently added a $30,000 rotary washing plant to its operations in Cuero, Texas. The company, formed in April, 1950, is owned and operated by Willis Barfield, Henry Horst and E. T. Teller.



GM Diesel-powered crushing plant

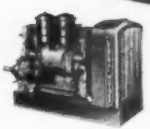


GM Diesel powers air compressor for drilling



GM Diesel-powered Koehring shovel

Only Two Hours' Down Time in Two Years



CRUSHING 50,000 tons of limestone a year, Casey Stone Co., of Liberty, Kentucky, depends on GM Diesels *exclusively* to power its plant.

Jaw crusher, roll crusher and hammermill are each driven by a GM 6-71 engine. Another 6-71 drives the compressor and a 3-71 powers the shovel.

"GM's are entirely satisfactory . . . give us all the power we need," says L. C. Brock, manager. He reports they haven't had more than two hours' down time in two years and total repair costs for all five engines in three years' operation amounts to less than $250.

Why Is It? The answer is General Motors Diesels are built to do *more work at lower cost.* Their sturdy two-cycle operation delivers power at every piston downstroke—smooth, steady power that's quick to respond to varying load demands. Fuel consumption is low, and simplified design with readily accessible interchangeable parts makes maintenance easier and much more economical.

All these features add up to dependable, profit-making operation. It explains why GM Diesel engines are offered as standard or optional equipment in over 500 kinds of power machinery by 120 different manufacturers. Write for full details.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES ... Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS ... Up to 800 H.P.

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

Measurement of Cement Specimen Lengths

Accurate optical method developed for measuring minute changes occurring in cement specimens upon curing

By DR. ALFRED BEITLICH*

IN THE COURSE of an investigation of the behavior of hydrated portland cement when stored in atmospheres of varying degrees of humidity, the necessity arose to measure extremely small changes of linear expansion and contraction of specimens of hardened neat cement pastes. A very high degree of precision was required for these observations. To facilitate the exchange of moisture between the specimen and the surrounding atmosphere, the shape of the specimen was so dimensioned that it allowed a maximum exposure. Therefore the thickness of the specimen was only 1/16 in., the length 3 in. and the width ⅜ in. The well-mixed paste was poured into the mold standing vertically in order to avoid distortions of the slab due to possible settling of the cement during the early stages of the hardening process.

The specimen was taken out of the mold as soon as the paste had hardened sufficiently to permit removal without danger of damage. As it was intended to measure the length changes of the specimen already at very early stages, it had to be provided with reference points right after being removed from the mold. Marks were scratched near both ends with a very fine steel needle, but these marks proved to be too wide and too uneven in the still rather soft cement and did not permit exact focusing under the measuring microscope. Therefore this procedure of marking was soon discontinued.

The next attempt to obtain clearer reference points was to imbed small pieces of capillary glass tubing near both ends of the specimen. While this method established reference points that could be accurately straddled by the spider line of the microscope, the glass capillaries did not remain firmly imbedded in the thin specimens and became loose or fell out completely after a short time.

*Technical director, Obergimpern, Germany

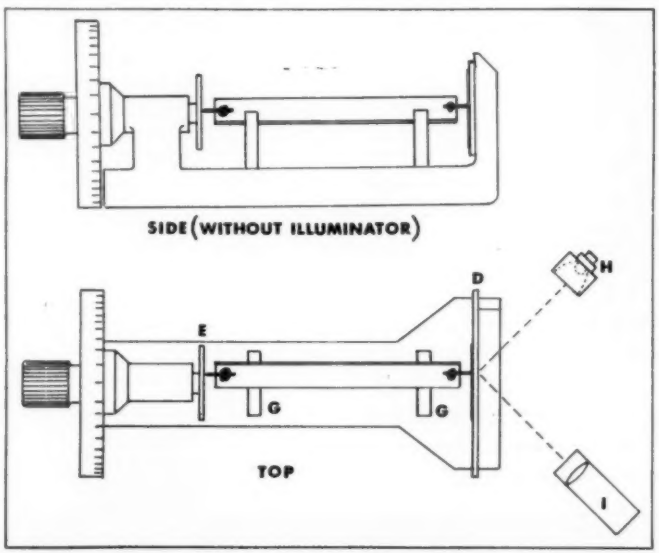


Fig. 3: Top and side views of optical device for length measurements

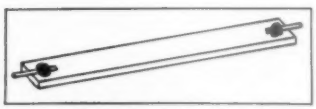


Fig. 1: Cement specimen

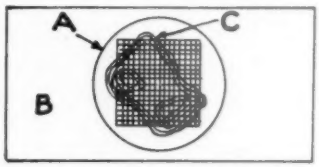


Fig. 2: Microscope slide with interference lines

The problem was finally solved satisfactorily by sealing a short piece of thin glass rod, rounded at one end, to each end of the cement specimen with a drop of sealing wax (Fig. 1). During the process of affixing the glass rods, the center of the specimen was protected with a glass cover to prevent premature evaporation of moisture.

The length measurements between the outer ends of the glass rods were taken at short intervals by means of a micrometer slide graduated to .0001 in. It was soon discovered that this procedure did not provide the necessary precision attempted in this investigation and duplicate readings did not show the required degree of reproducibility. While the accuracy of the instrument itself was adequate, there generally was some doubt as to the establishment of contact between the reference points of the specimen and the feeler points of the micrometer slide. Furthermore, the contact pressure had to be rather light in order to prevent damage to the cement specimen.

This difficulty was overcome by the development of a device which establishes very accurately the exact instant when contact is made between the specimen and the measuring instrument. The device utilizes the fact that interference bands, caused by light striking upon a very thin film, are changed by the slightest variation of the thickness of this film, such as may be caused by the pressure exerted by the contact in the above case.

Interference can be observed in the

(Continued on page 142)

Considering there are 7 Bemis Multiwall Plants . . . and 36 sales offices . . . and a small army of Bemis factory representatives and salesmen . . .

You see why so many companies use Bemis Multiwall Bags and Bemis Packaging Service. You can't beat the combination of quality and experience.



BEMIS BRO BAG COMPANY

Bemis

Bemis—an American enterprise in business since 1858 . . . employing 10,000 men and women in 45 plants, mills and sales offices . . . in 28 states, coast to coast.

Labor Relations Trends

(Continued from page 83)

mination of the plan upon expiration of the union contract and for a reversion to the employer of any funds then remaining after providing for all liabilities to pensioners and those who may satisfy the requirements for pensions at such time. No more than $5000 would be deductible under clause (i). The deduction, however, is not limited to a determination under clause (i). If, for example, the past service liability with respect to employes who may retire within the contract period is $200,000 and the normal cost for such employes is $5000, the deduction under clause (iii) would be $25,000, i.e., 10 percent of $200,000 plus $5000.

"*Case 3* is that of an employer whose contract requires him to contribute 10 cents per hour worked by all employes within a bargaining unit represented by the union. The contributions must be used for the benefit of such employes and under no circumstances can there be any reversion to the employer. The contract is for a five-year period and the plan is established to run concurrently therewith and indefinitely thereafter, as indicated by the separate plan document. Fixed benefits are provided upon retirement after a stated period of service. The plan has been found to meet the requirements of section 165(a). Actuarial computations have been made which the employer certifies show that:

"(a) The contributions are sufficient to provide the full costs of the prospective pensions for employes expected to retire under the plan during the five-year period, and

"(b) Such contributions are also sufficient to meet the normal costs and interest accruing on the unfunded past service liability for all employes in the bargaining unit.

"The employer also certifies that he accepts as reasonable the methods and assumptions used in such computations and the results thereof. The past service liability under clause (iii) for all employes in the bargaining unit is $1,000,000 and $400,000 for those who may retire within the five-year period. The normal cost is $50,000 for all and $10,000 for those in the five-year group. The deduction under clause (iii) is limited to $150,000, i.e., 10 percent of $1,000,000 plus $50,000 for normal cost.

"*Case 4* consists of a pension plan established pursuant to a union contract which contract is to terminate at the end of five years. The employer is required to contribute during each of the five years an amount equal to at least 20 percent of the cost of life annuities of stated amounts for all retiring employes during the particular year who reach age 65 and have 25 years of service and proportionate annuities for those who have at least 15 years of service but less than 25. No cut-off period is mentioned in the plan and all communications pertaining thereto recite that it is established on a continuing and permanent basis. The plan has been found to meet the requirements of section 165(a). Under the method of funding adopted by the employer annual contributions are made equal to the normal cost and amortization of the total past service liability on a 30-year basis for all union employes regardless of age. For the first year of operations, the normal cost and applicable portion of the past service cost, computed on such basis, amounted to $75,000. Such amount was contributed by the employer although no employe reached the retirement age and retired during that year. The full amount of $75,000 being within the limits of clause (iii) as applied to all union employes is deductible.

"*Case 5* is similar to case 4 except that provision is made that after taking care of all liabilities to pensioners upon the expiration of the contract period any remaining funds are to revert to the employer. The payroll of union employes who are 60 years of age and older and will have at least 15 years of service at the expiration of the contract period is $100,000. The past service liability with respect to such employes is $200,000 and the normal cost is $5000. The maximum allowable deduction is $25,000, i.e., 10 percent of $200,000 plus $5000, notwithstanding the fact that $75,000 was contributed.

"*Case 6* is that of a plan established pursuant to a union contract which contract provides that the employer must continue contributions to the plan on a specified minimum basis for the period of the contract—five years. The plan provides that the employer may discontinue contributions at any time after such period, and that in the event of such discontinuance no employe who has not already become eligible for a pension by that time may thereafter become eligible for any benefits under the plan. The plan is funded through a trust which also holds funds of another plan of the employer, the other plan covering employes who are not covered by the union plan. Any funds which may remain from contributions to the union plan after providing for the pensions of employes who become eligible for retirement thereunder prior to discontinuance will remain in the trust to meet liabilities under the other plan and may revert to the employer after the satisfaction of all such liabilities. Only the employes who can become eligible for retirement under the union plan during the five-year period for which the employer is committed to continue it will be considered covered by such plan for the purpose of determining the costs thereof and the limitations under section 23(p) during the first five years. In any later taxable year, if the union plan is continued beyond the five-year period, the only employes who may be considered covered thereunder for such purpose are those who could become eligible for retirement under its terms by the end of the taxable year, unless terminated sooner, in which case only those who became eligible before termination will be considered covered.

"Correspondence [directed to the Bureau of Internal Revenue] regarding this release should refer to the symbols IT:US 67 number hereof."

Kiln Efficiency

(Continued from page 115)

we will leave it simple. When kiln B 1 was forced it moved to the B 2 location and, after it was quadrated, it moved to B 3.

"C 1" was also a simple kiln. It was equipped with a good cooler and its performance characteristics then moved it to C 2. If the kiln had been operated at higher capacity it would have moved to C 3 and quadration would have placed it in the target area.

"S 1" was a small oil-fired kiln giving very poor results due to low draft. Its draft was increased and its performance rating changed to the S 2 location.

"L 1" was a long, simple kiln. Results were not bad considering the low capacity rating. A cooler was installed with a short stretch of quadrants and it moved to location L 2. It is expected, with further capacity increase, to move to L 3.

That L 1 is in its particular position indicated that kiln length has a value. Kiln A is the very long kiln. Its efficiency rating is good considering its low capacity rating.

Kilns A, B, and L indicate that, if one does not strive for better performance, the long kiln has an advantage, but where there is such effort that better results are possible with short units.

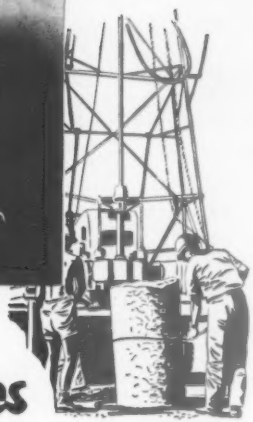
"BB" kiln is off scale, indicating that there is something radically wrong, particularly since it has a good cooler. Upon installation of a dust collecting system, it moved to BB 2. The reason is increased draft and more complete combustion, which previously was bad. But full advantage was not taken of the opportunity or it would have located closer to the target.

(To be continued)

Expansion at Mica Mine

DE ANZA ENGINEERING CO. is under contract to build a mill at a mica mine for the processing of mica and other by-products for the Idaho Beryllium Mica Corp. Allen White, president of the engineering company, said that the deposit is rich in beryllium, a scarce material used in steel manufacture. This element is in great demand, especially for military purposes. The mica, too, can be processed, said Mr. White, and much of the ore formerly discarded will be processed for sale, pulverized and in flake form.





For Dependability—
Dodge Diamond "D" Friction Clutches

When the George E. Failing Supply Company designed a drilling rig to take huge "bites" out of solid rock, they came to Dodge for a clutch with the stamina to withstand such gruelling service. (See illustration above.) "We called on Dodge because of their successful pioneering in the application of well drilling hoisting drum clutches," says Failing's chief engineer.

The Dodge Diamond D Friction Clutch has a world-wide reputation for ruggedness, for compactness (it is completely enclosed in both engaged and disengaged positions) and for *dependability.* Adjustment is very simple—an Allen wrench at one point does the job, as shown above. It is available in single, double or triple friction plate design in several types of construction. Capacities range from 20 to 330 hp. at 100 rpm. The famous Dodge Rolling Grip Clutch (no toggles) is available in sizes from 1.3 to 21.2 hp. at 100 rpm.

Write for complete information.

DODGE MANUFACTURING CORPORATION, 2600 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSION-EER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.



FIRST IN POWER TRANSMISSION MACHINERY!



V-BELTS AND TAPER-LOCK SHEAVES



TORQUE-ARM SPEED REDUCERS



DODGE-TIMKEN PILLOW BLOCKS



SOLID STEEL CONVEYOR PULLEYS

Screens Any Ag-Lime without blinding



Unitized Head-motion: This exclusive head-motion is precision built, can be demounted as a complete unit and interchanged. Normal bearing-housing wear can be compensated for by replaceable bronze bearing sleeves. Strains on shaft are relieved with counter-weights on both sides of spherical roller bearings.

Properly install this Deister Ag-Lime Screen and you can be sure of high capacity in handling any ag-lime, no matter how *damp or sticky* it may be.

Not once, since it was introduced two years ago, has this screen failed to perform satisfactorily *without blinding*.

And here are the three *proved* reasons why:

1. *Longer stroke:* The special construction features permit a longer stroke at higher speed than found on any other screen.
2. *Far higher speed:* This screen operates at up to 2,000 rpm . . . that's 2,000 complete cycles per minute.
3. *Graduated length of stroke:* The exclusive head-motion also amplifies the stroke more at the feed end where material is deeper, with a lesser stroke at the discharge end where accuracy is your goal.

All of these things are possible because of the new, unitized head-motion and the super-strong but light weight aerodynamic type of construction.

Plus: In addition to these features, you also obtain the well-proved Deister screen-cloth tension features which eliminate whipping . . . the special springs which isolate all vibration from supporting structure . . . adjustable throw, simply made in a few minutes . . . and interchangeable flywheels so you can place the drive on either side.

For high capacity without blinding on any Ag-Lime, specify a Deister Ag-Lime Screen. Write for Bulletin No. 51 today.

DEISTER SCREENS

DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

Cement Specimen Lengths

(Continued from page 138)

colors of soap bubbles or of thin films of oil on water. These colors are due to the fact that, when white light falls upon a thin transparent film, some is reflected at the first surface and, from the light that enters the film, some is reflected at the second surface while the rest is transmitted. Looking at the film, the eye receives waves which have passed over paths of different lengths. This results in a dissolution of the white light into its basic colors. Any change in the thickness of the film which produces the interference colors will cause a change of these colors, and this fact is noticeable as a slight movement of the bands.

In the above investigation, the interference bands were created by a thin film of air, produced in a very simple manner by the device illustrated in Fig. 2. A microscope cover glass (A) is firmly pressed with a sliding motion against a microscope slide (B) provided with a grating of very fine lines. This cover glass, which adheres very tightly to the slide, is thereby slightly deformed and the parallelism between the two glass plates is destroyed. This causes the appearance of irregularly shaped colored interference lines when the plates are viewed under reflected light (C).

If a very slight pressure is applied on the thin cover glass, such as when contact is made between the glass and an object the length of which is to be measured, the pressure will cause an infinitely small deformation of the thin plate and thereby change the thickness of the air film between the plates. This will result in a shifting of the position of the interference lines which can be readily observed.

The arrangement of this device is shown in two views in Fig. 3. The glass plate with cover glass attached is mounted rigidly in vertical position at one end (D) of the micrometer slide. The micrometer movement operates a movable brass plate (E) which is parallel to the glass plate. The object to be measured, in this case the cement specimen, is placed between the plates on two supports (G) and moved toward the glass plate. When contact is made, the interference lines shift their position. The observation is facilitated by illumination from a light source (H), a small electric light bulb operated by a flashlight battery. The light is reflected from the glass plate and can be viewed through a magnifying lens (I). Any change of position of the interference lines with respect to the grating on the glass plate can be readily observed and the micrometer reading is thereby accurately determined.

This device enables rapid length measurements by means of gauges or micrometers with a greater accuracy than that which can be obtained with mechanical means of contact.

HARD FACING WHERE IT PAYS



Elevator buckets of cast steel (annealed) are hard faced on the top wearing edge with WEAR-ARC 12 to increase life against impact and abrasion. Ninety-five pound hammers for the impactor, 10 lb. and 20 lb. hammers for the hammermills, and dipper and shovel teeth are all built up with WEAR-ARC WH and hard faced with WEAR-ARC 12 to increase life as much as three times under severe impact and abrasion.

To reclaim worn equipment and hard face against excessive wear, you will find one, or a combination of two, of the seven basic WEAR-ARC hard facing electrodes does the best job . . . increases life as much as four times or more.

WEAR-ARC WH is ideal for build up on manganese steel; WEAR-ARC 12 for providing that hard wearing surface.

Ask for bulletin No. 10550, illustrating and describing properties and welding procedures for the complete line.

"I Like the rod that comes in the RED can"



SEE YOUR NEAREST
ALLOY RODS DISTRIBUTOR

ALLOY RODS CO. York, Penna.

NEW "35" SINKER



Easy to handle, the new Thor 35-lb. Sinker features new Blower Valve for full line pressure blowing, in addition to all the many design and operating advantages that have made Thor Rock Drills outstanding performers wherever percussion tools are used.

Ask for Circular JE-1139

NEW SINKER LEGS



3 GREAT MODELS

Ask for Circular JE-1132

Compact air feed leg clamps to standard Sinker Rock Drill, converts upward lifting action to positive forward feeding pressure. ONE MAN can carry it . . . set it up . . . drill round after round without wasted time or motion.

GREAT COST-CUTTERS WITH CARBIDE BITS



Replace larger Drifters, jumbo set ups, large diameter drill steels and bits, large sizes of air compressors, air line and explosives!

INDEPENDENT PNEUMATIC TOOL COMPANY
AURORA, ILLINOIS

FREE! Ask for Mining Tool Catalog MC-1

BUY IT from your DISTRIBUTOR

Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

"Why" of Liming

(Continued from page 123)

where the plants can take it up, making them better fed and healthier. The higher pH level keeps the iron from coming into solution too readily so that it does not tie up the phosphorus and make it less available. Consequently liming the soil a proper amount really is a way of feeding the soil its phosphorous efficiently, or a way of helping keep conditions right so the plant can get its phosphorus readily. Therefore, as a consequence of liming is the influence of increased efficiency of phosphate feeding by plants. Furthermore, the calcium may be absorbed by the clay and take up some of the absorption spaces or positions which otherwise would be free to pick up potassium competitively against root activity. In this way the liming of soil may make your potassium fertilizing program more efficient by keeping calcium on the clay particles in absorption positions in preference to the more expensive potassium out of your fertilizers.

Again, the calcium, according to some research workers, reacts with your organic matter and your clay to give crumb or granular structures which are open and porous, giving the soil better tilth, better aeration and better utilization of water. Finally, the added calcium serves as a nutrient to beneficial bacteria, and the proper pH level raised by liming produces a more favorable medium for beneficial soil microorganisms and which are even essential to the growth of certain important legumes such as sweet clover and alfalfa. If we study these individual effects of lime separately we might find results which when added together would not add up to the total beneficial effect of the lime on the crop. This is because the benefits of lime are more than additive. They stimulate and augment each other. In other words, Dr. Shaw was right: in nature 2 + 2 often equals more than 4.

Responsibility for Dust

(Continued from page 128)

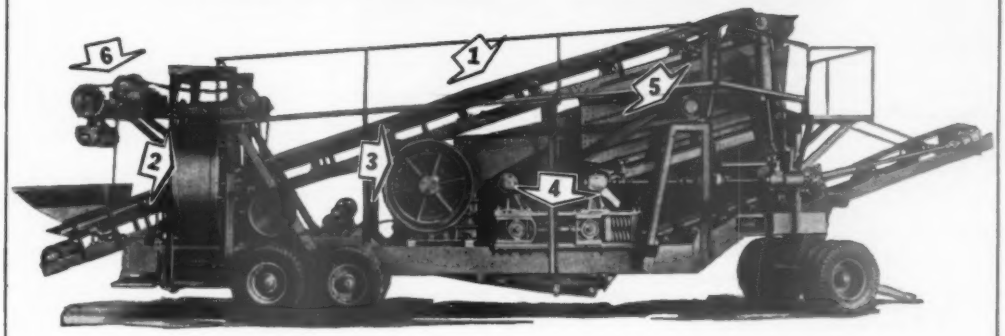
that it is concerned with and now working on these problems.

Money spent on dust control is often unproductive in an economic sense. An objective measure of its effect can be obtained by dustfall determinations. The real measure of the value gained, however, lies in the community's reservoir of good will toward the plant.

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(3) Mitchell, J. P., *Ind. Eng. Chem.* **6**, 454-8 (1914).
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6 reasons..



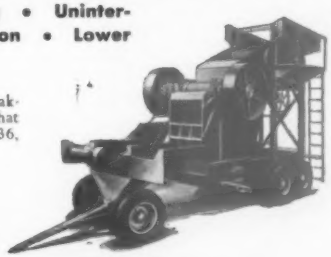
DIAMOND

"95" Portable ROTOR-LIFT PLANTS Produce . . . More Aggregate . . with Less Down Time . . at LOWER COST!

1. **Straight line principle** of flow—without extra scalpers—means more material—faster—at less cost.
2. **Rotor-Lift** transfers material from under-crusher conveyor to feed conveyor which returns it to screen for re-screening. Material is spread evenly on feed conveyor—without batching or bunching—eliminating screen overload.
3. **"Double Impact" Primary Jaw Crusher** delivers greater tonnage of crushed material—per square foot of jaw area—to screens and conveyors.
4. **Secondary Roll Crusher** steps up plant output by eliminating reruns through primary jaw crusher.
5. **Balanced Vibrating Screen** with longitudinal center and center of balance on same line gives even material distribution over screen surface.
6. **Swivel Drive** delivers power to swivel field conveyor—permits loading from large pit area without moving plant.

DIAMOND "95" ROTOR-LIFT PLANTS GIVE . . .

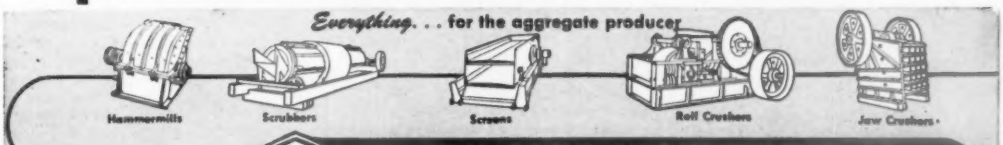
Higher Capacity • More Uniform Crushing • Uninterrupted Flow of Material • Higher Production • Lower Cost Per Ton



DIAMOND PORTABLE PRIMARY CRUSHING PLANTS handle breaking of extra large rock for feeding to crushing and screening operations that follow. Portable Primary Plants include five standard sizes with 15x24, 15x36, 20x36, 24x36, and 30x42 Jaw Crushers.

YOUR DIAMOND REPRESENTATIVE will give you the complete "Line-Flo" story . . . the straight line flow design which gives greater aggregate production. **Write Dept. F for Bulletin D-51-A.**

Everything. . . **for the aggregate producer**



DIAMOND

DIAMOND IRON WORKS, INC.
AND THE MAHR MANUFACTURING CO. DIV.
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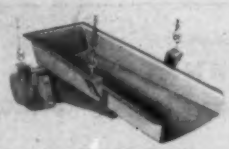


SYNTRON

"Vibra-Flow"

VIBRATORY FEEDERS

With Variable Control of Rate of Flow



FLAT PAN FEEDERS

Will also handle most types of bulk materials — abrasive, fine, lumpy—hot or cold—dry or damp—at variably controlled rates from pounds to hundreds of tons per hour—to mixers, belts, crushers, screens, blenders, driers, packaging machines, etc.

Due to absence of motors, gears, cams, pulleys, eccentrics, sprockets, and other wearing parts, Syntron Feeders operate with an exceptionally low maintenance cost.



TUBULAR FEEDERS



GRIZZLY FEEDERS



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CONVEYORS

WRITE FOR CATALOG DATA

Experienced Syntron Material Handling Engineers are ready to work with you in applying the proper model Feeders to your problems.

SYNTRON COMPANY

450 Lexington Avenue — Homer City, Penna.

Controlled Materials Plan

NATIONAL PRODUCTION AUTHORITY has announced that the Controlled Materials Plan (CMP) will go into effect July 1, 1951. Under this plan, defense and defense-supporting production and construction procedures will be scheduled and essential materials made available, using the same common denominators as in World War II —steel, copper and aluminum. At the same time, N.P.A. will encourage the continuation of other production to the extent that materials are available and other N.P.A. regulations permit. The Controlled Materials Plan, developed during World War II, proved to be the best method to guarantee a balanced flow of materials, made available on time and in sufficient quantity for essential production.

The products under the plan fall into two categories: "A" products and "B" products. In general, "A" products are those where the most convenient method of production authorizations is vertical. Producers of "A" products get their authorizations and material allotments from their customer. A prime contractor's customer is a government agency; a subcontractor's customer is a prime contractor or another subcontractor.

The "B" list includes certain products where it is most practicable to furnish authorizations horizontally, directly to the producer. In general, this will include certain civilian-type products, industrial machinery and equipment and components which are needed for defense. Producers of the "B" list will obtain their authorizations and allotment from their N.P.A. industry division. It is planned that after the first quarter of operation, CMP will be decentralized. In World War II it was found that in the majority of cases, CMP authorizations and allotments were best handled through field offices. Most producers will then apply to their local offices.

As blueprints and orders are increasingly translated into actual production and actual consumption of basic materials, CMP is expected to provide a continuation of the orderly flow of materials and production of the things needed, on time, and in the right quantities, for defense and for defense supporting programs. Through CMP, N.P.A. will tell producers what the government has to have; CMP will furnish the time table for getting things done, and it will give producers the authority to carry out the program.

The authorization or allotment of basic metals under the plan is not intended as a hunting license; it is a a definite program to guarantee supply. CMP makes it possible to combine a wide range of essential needs into a common denominator and is intended to accurately match up needs with supply.

A major share of the responsibility for getting out the necessary production is left to industry. It will be up

LIPPMANN SELF PROPELLED DUAL CRUSHING PLANT

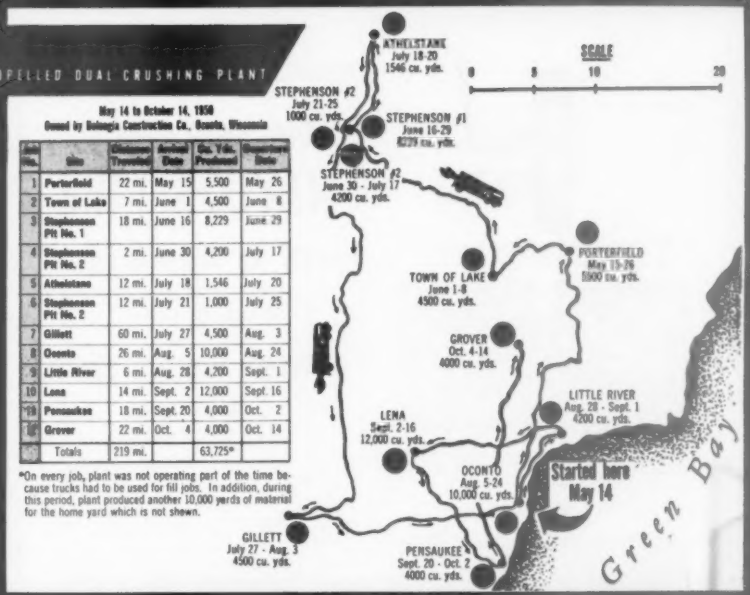
Works 12 pits in 5 months

DRIVES 219 MI. HITS 1100 YARDS PER DAY with *Circuit Rider*

May 14 to October 14, 1950
Owned by Belongia Construction Co., Oconto, Wisconsin

No.	Site	Distance Traveled	Arrived Date	Cu. Yds. Produced	Finished Date
1	Porterfield	22 mi.	May 15	5,500	May 26
2	Town of Lake	7 mi.	June 1	4,500	June 8
3	Stephenson Pit No. 1	18 mi.	June 16	8,229	June 29
4	Stephenson Pit No. 2	2 mi.	June 30	4,200	July 17
5	Athelstane	12 mi.	July 18	1,546	July 20
6	Stephenson Pit No. 2	12 mi.	July 21	1,000	July 25
7	Gillett	60 mi.	July 27	4,500	Aug. 3
8	Oconto	26 mi.	Aug. 5	10,000	Aug. 24
9	Little River	6 mi.	Aug. 28	4,200	Sept. 1
10	Lena	14 mi.	Sept. 2	12,000	Sept. 16
11	Pensaukee	18 mi.	Sept. 20	4,000	Oct. 2
12	Grover	22 mi.	Oct. 4	4,000	Oct. 14
13	Totals	219 mi.		63,725*	

*On every job, plant was not operating part of the time because trucks had to be used for fill jobs. In addition, during this period, plant produced another 10,000 yards of material for the home yard which is not shown.



SELF-PROPELLED CRUSHING PLANT

Belongia Construction Co. Easily Covers 60-Mile Radius Around Oconto, Wis. with Lippmann Self-Propelled Dual Crushing Plant. Read How You, Too, Can Move Ahead to Greater Profits!

Just think of it! You're working in a pit . . . the job is almost done . . . and you've a chance for another job 50 miles away, but it's a tight schedule.

How would you like to climb into a *self-propelled* crushing plant . . . pull out of the pit . . . drive onto the highway . . . and wheel along to the next job *at 18 mph?*

Then picture yourself driving into the new pit in your Lippmann Circuit Rider . . . and *four minutes* after you leave the highway, you're loading a truck with stone.

Nice profitable picture, isn't it?

And that's just what Belongia Construction Co., Oconto, Wis., does with their Self-Propelled Lippmann Circuit Rider, the complete, all-in-one dual crushing and screening plant.

HITS 1100 YARDS PER DAY!

Turning out ¾ in. stone, they consistently were able to hit 1100 yards in an 8-10 hour day. Because in the pit, Circuit Rider easily follows the shovel — there are no separate bins, conveyors or engines to set up and adjust . . . no jacking, leveling or excavating necessary on the plant itself.

Check the "log" of this typical Lippmann Circuit Rider owner above. See for yourself why leading operators find it pays to own the only self-propelled dual crushing and screening plant on the market today.

2005



You can put yourself in this picture— Belongia shovel-feeds self-contained Circuit Rider from one end, discharges into trucks at the other.

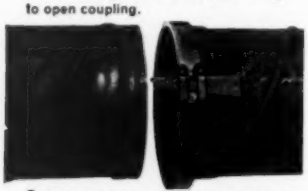
FOR ALL THE FACTS on the complete Lippmann line for pits, mines and quarries write for: Grizzly King Jaw Crushers (Bulletin 1100), Screen-All Vibrating Screens (1200), Pulverizers (1160), Belt Conveyors (1400), Gyra-Gnome Secondary Crushers, Circuit Rider Self-Propelled Crushing Plants, Portable Washing Plants, Apron Feeders (1450).

LIPPMANN ENGINEERING WORKS

4603 West Mitchell St., Milwaukee 14, Wisconsin



1 Drive wedge into the two parallel lugs to open coupling.



2 Slip coupling over pipe end and put next joint of pipe in place.



3 Drive out opening wedge so coupling snaps into place on grooved ends of pipe.



4 Drive wedge home into the three lugs on coupling.

You can connect

NAYLOR PIPE

with a hammer...

when you use

NAYLOR WEDGE-LOCK COUPLINGS

One, two, three, four—and the connection is made in seconds, not minutes. And a hammer is the only tool you need.

That's how simple it is to connect Naylor Pipe with Naylor Wedge-Lock Couplings. Built in one piece with gasket already in place, this Naylor Coupling provides a tight, leakfree joint faster than ever before possible.

Since the coupling takes up little more room than the pipe itself, it permits the line to hug the wall in tunnels or wherever space is limited. Lines can be made up with only one side of the pipe in the open.

For the full story on this practical Naylor combination, write for Bulletin No. 507.



NAYLOR PIPE

Naylor Pipe Company, 1237 E. 92nd St., Chicago 19, Ill.
New York Office, 350 Madison Avenue, New York 17, N.Y.

to the producer with a prime contract, for example, to allot controlled materials to his subcontractors and schedule production so that essential requirements are ready on time and in the right quantities (the exception is certain common components which are in such great demand that special programs will be devised by N.P.A. to assure their availability).

The Controlled Materials Plan, as set up, is intended to be a flexible plan, insuring defense production through its authorization and encouraging civilian production. For the time being, at least, CMP will be limited to defense production and to a few special programs for production of vitally needed defense-supporting items. A substantial balance of the basic metals is expected to be available for non-defense production. A rough balance between supply and demand for the left-over balance will be preserved by using other N.P.A. powers, such as "M" or limitation orders, to reduce less essential civilian production and to assure that a proportionate amount of materials will be available for civilian business, large or small.

Forms, operating instructions and the official "B" list were made available in May, giving producers coming under Controlled Materials Plan programs two months to prepare before the plan goes into effect July 1.

Canadian Asbestos

THE CANADIAN ASBESTOS INDUSTRY, which produces approximately 70 percent of the world's output of asbestos, produced 810,000 tons of asbestos fiber in 1950, valued at approximately $65,000,000, as against an output of 575,000 tons, valued at $40,000,000 in 1949. This was an all-time peak in both tonnage and value. One important contributing factor was the opening of a new mine in Munro township in Ontario.

German Cement

REPRESENTATIVES OF THE West German cement industry have estimated the West German cement requirements for 1951 at 14,000,000 tons. Last year 11,000,000 tons were produced in that area, of which 1,500,000 tons were exported. Much of the increased requirement is due to the occupation powers' building projects.

Considerable concern has been expressed about the impact of the coal shortage on the cement industry and the extent to which this may make it impossible to meet the 1951 cement requirements. It is hoped that existing reserves, some private coal purchases, as well as the change-over to the production of ferro-concrete and the admixture of slag may help increase actual cement availability, though it is not expected to meet the 14,000,000 ton annual production rate needed. It is feared that insufficient supplies of cement may halt important construction projects.

HERE'S WHAT USERS SAY ABOUT THE DEMPSTER-DIGGSTER—

"IT'S THE FASTEST, MOST EFFICIENT EXCAVATING TOOL I HAVE USED"

—A. J. METLER, *Contractor*

"During the past several years," Mr. Metler says, "I have owned and operated four conventional full revolving crawler and truck mounted shovels and cranes and know that they have a direct application to many types of excavating work.

"On the other hand, I have learned that the fast operation of the tricycle mounted Dempster-Diggster permits it to be used on certain types of work to a considerable advantage. Its mobility permits quicker transfer from one job to another.

"I have had excellent results from the Dempster-Diggster and consider it the fastest and most efficient excavating tool I have used."

Mr. Metler is one of the many contractors who has found the Dempster-Diggster to be "the fastest and most efficient excavating tool" available.

This speed and efficiency in excavation work is accounted for, mainly, by the Diggster's exclusive independent hydraulic crowd and hoist action, its hydraulic steering and wheel-type traction.

The power crowd permits bucket to keep digging until loaded . . . no digging with wheels. The hydraulic steering gives the driver sensitive, easy, finger-tip control. When accelerated, a one-handed twist of the steering wheel puts the machine in any desired position. By operating on rubber-tired wheels, the Diggster, of course, can move at the fastest possible speed on the job and to and from jobs.



The Type HL Dempster-Diggster is equipped for extraordinary high dumping. The bottom of bucket is 13 feet six inches above ground.



HERE IS THE NEW TYPE HL DEMPSTER-DIGGSTER shown excavating with a 1¼ cu. yd. (heaped) digging bucket. The Type HL Dempster-Diggster will dig through an 18 foot bank while the Type GRD digs through a 15 foot bank.

The Dempster-Diggster is a "must" for contractors, large or small operators alike.

The Dempster-Diggster has a 15 foot turning radius, is 20 feet long when bucket is in traveling position, and is nine feet and six inches in height.

Four standard interchangeable buckets of two types are available. Digging buckets with four bottom teeth in 1 and 1¼ cubic yard (heaped) capacities, and materials handling buckets in 1½ and 2 cubic yard (struck) capacities.

For fast, efficient operation in difficult terrain, the Diggster is available with crawler-type traction.

"I have not personally used the Dempster-Diggster mounted on crawler treads," Mr. Metler said, "but have seen it in operation on jobs adjacent to mine. I know it is a very effective tool and has many applications."

Construction men have found that on big jobs the Dempster-Diggster has no equal for working in tight places and for freeing big shovels for heavier work. The Diggster has an 8 foot 10 inch crowing reach, will dig through a 15 foot bank, and will dig 15 inches below grade.

Pound for pound, the Dempster-Diggster will out dig and out load any other available competing machine in tough going! Let us prove that statement!

Write today for complete information and prices. The Dempster-Diggster is a product of Dempster Brothers, Inc.



This is the type GRD Dempster-Diggster, which Contractor A. J. Metler considers "the fastest and most efficient excavating tool I have used." It is shown digging 15 inches below grade.

DEMPSTER DIGGSTER

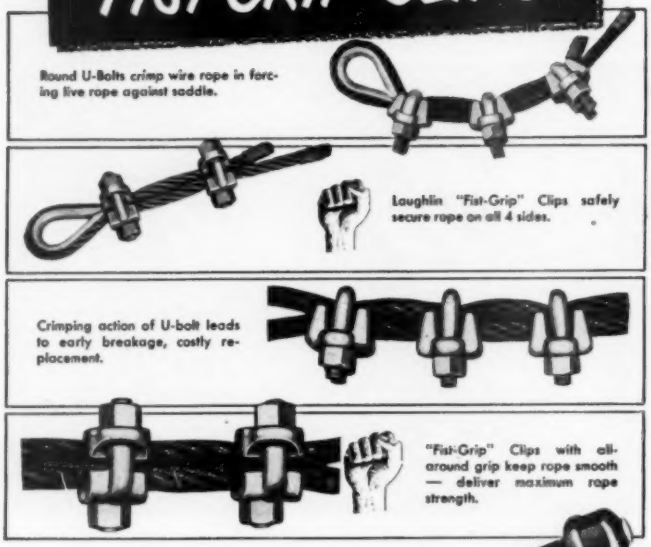
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STRONGER — bolts integral part of saddle. Complete unit drop-forged.

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Amendment Limits DO-97 Rating

NATIONAL PRODUCTION AUTHORITY has limited the use of the DO-97 rating by an amendment to Regulation 4 and Direction 1, which was issued February 27, 1951, for the purpose of establishing a uniform procedure by which any business enterprise could use a government priority rating to obtain limited quantities of maintenance, repair and operating (MRO) as well as minor capital additions. The amendment to this regulation, which became effective April 16, 1951, is important principally because Table I contains a list of items which no longer is subject to the DO-97 rating. These listed items must now be obtained on the open market, N.P.A.'s explanation being that there was such an acute competition for these commodities that important defense needs were being prejudiced by the demand from civilian sources.

The materials listed in Table I are: all basic, organic or inorganic chemicals, their intermediates and derivatives other than compounded end-products not customarily sold as chemicals; items appearing in List A of N.P.A. Order M-47, as the same may be amended from time to time; nylon fibers and yarns; packaging materials and containers; paint, laquer and varnish; paper and paper products; paperboard and paperboard products; photographic film; rails, tie plates, track spikes, splice bars, rail joints, frogs and switches; rubber tires and tubes.

A DO-97 rating which, prior to April 16, 1951, was applied or extended to any contract or purchase order for any material listed in Table I, is now cancelled and such rating will no longer have any effect whatever; however, it does not mean that the contract or purchase order itself is cancelled or otherwise affected by the regulation.

It continues to be true that a producer is not required to use the DO-97 rating for obtaining MRO supplies for minor capital additions. If he wants to stand the chance of getting all necessary supplies in the open market, he may do so and will therefore be free from the restrictions set up by Regulation 4 for the establishment of MRO quotas.

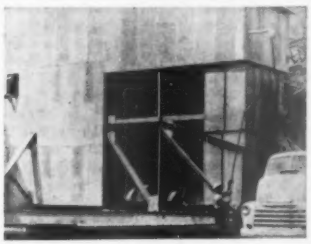
Every person making any use of the DO-97 rating must establish his MRO quotas. In figuring such quotas, he may include all expenditures for MRO (including MRO materials listed in Table I) in the applicable 1950 base periods, but shall not include expenditures for minor capital additions. (For establishing quarterly MRO quotas, see April, 1951, issue of ROCK PRODUCTS, p. 95).

It it is found that the MRO quota, as established, is inadequate, a special application may be filed. If a person's quota is increased by specific authorization of the N.P.A., he may continue to operate with the increased

quota as his standard quota unless the increase is granted on a temporary or seasonal basis, or is otherwise restricted by the terms of the authorization. If granted as a seasonal quota, it may be used only in the corresponding quarter of subsequent years. Increases are not retroactive—an increase in quota will not be granted for any period prior to the filing of the application.

Shale Planer

GENERAL ELECTRIC CO., Schenectady, N. Y., has powered a shale planer, built by the United Brick and Tile Co., Oklahoma City, Okla., with a 50-hp. ball bearing, drip-proof Tri-



Planer for sizing shale

Clad motor. The planer operates against the face of the pit on a semicircular track. It is said that the machine eliminates blasting, and that the material comes out of the planer sized and ready for use. The unit is 32 ft. high and will take a 24-ft. cut.

Texas Cement Production

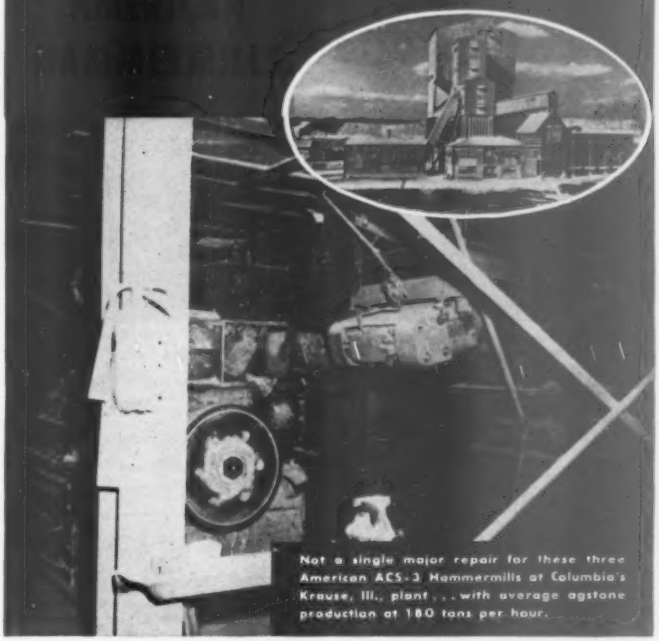
CEMENT PRODUCTION IN Texas for 1950 was estimated at about 17,000,000 bbl., valued at approximately $50,000,000. The ten producing plants in Texas accounted for about 8 percent of the estimated national total of 225,000,000 bbl. in 1950. Texas production was approximately 13 percent above its figures for 1949 and 133 percent over the 1939 output. Several plants have expanded facilities during the past year.

Deferment Forms

PERMISSION HAS been granted by the Army Adjutant General, at the request of the National Industrial Sand Association, to reproduce the AGO 591 forms for requesting deferment of Army reservists. Two copies of the form are being distributed to each member company. Additional copies may be obtained by members, upon request to the association.

If a request for deferment is denied by the local area commander, appeal may be made to the Army headquarters for the area in which the reservist is located. If again denied, a final appeal may be made to the Army Reserve Deferment Board in Washington, D. C. The association stated that it will assist members in obtaining a deferment when it reaches the Washington level.

Leading Agstone Producer Turns Out 717,909 Tons in 30 Months with . . . . .



Not a single major repair for these three American ACS-3 Hammermills at Columbia's Krause, Ill., plant . . . with average agstone production at 180 tons per hour.

The Columbia Quarry Company, a pioneer in the production of agricultural limestone, is producing today what is believed to be the world's largest single agstone output. In one year, they have shipped over 5% of the national tonnage. With this background of rock-crushing experience, Columbia has chosen to install American Hammermills in its three plants at Krause, Ill., Valmeyer, Ill., and Elsberry, Mo. At the Krause plant alone, three Americans have produced over 717,909 tons of agstone in the first 30-months—even though feeding on exceptionally hard Lower St. Louis Limestone.

Since their installation, *not one major repair* has been necessary on these Americans—in fact, no attention at all, except for the routine refacing of hammers and grate bars.

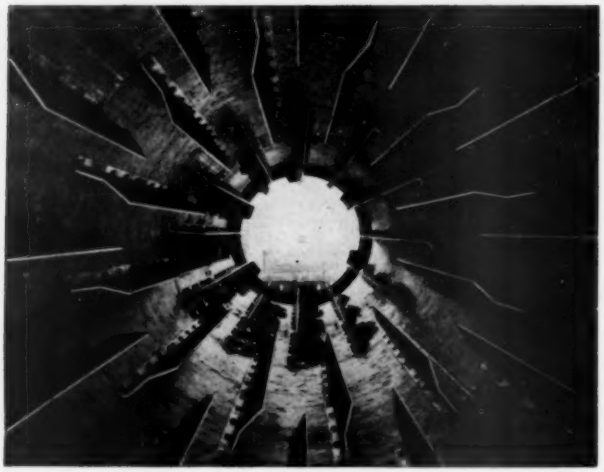
Nothing on the market today can equal these rock-hungry American ACS-3's for capacity, durability, or low cost of operation. Get all the extra-profit facts today. Write for free Bulletin "Better Stone Crushing".

American

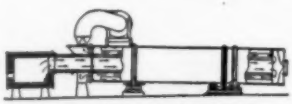
Originators and Manufacturers of Ring Crushers and Pulverizers

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St. Louis 10, Mo.

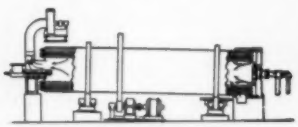
NEW DEVELOPMENT
IN CONTINUOUS ROTARY DRYERS



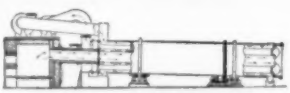
You are looking at the interior of a "Ruggles-Coles" Class "XH" Single Shell Rotary Dryer designed especially for continuous drying of sticky materials. Note heavy chains for "knock-out" of materials behind lifting flights at feed end.



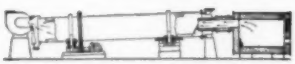
Class "XA" Double-Shell Direct-Heat Dryer



Class "XC" Rotary Steam Tube Dryer



Class "XB" Double-Shell Indirect Heat Dryer



Class "XF" Single-Shell Direct-Heat Dryer

Write for Bulletin 16-D-7, describing the complete line of "Ruggles-Coles" Rotary Dryer, Kilns and Coolers, built by Hardinge.

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Cement Production Overseas

GERMAN CEMENT PRODUCTION continued at a low level during the first six months of 1950, but improved after July. The depressed condition was due, it was claimed, to the delay in granting credits for the highway and other construction programs. Since July, however, all plants have been operating at full capacity. Active plants in the Federal Republic total 85, of which 75 are producing portland cement and 10 blast-furnace slag cement. Production in 1949 totaled 8,198,218 tons, including 6,683,510 tons of portland cement and 1,514,708 tons of slag-lime cement. Output in the first six months of 1950 was 4,545,215 tons of portland and slag-lime cement. Exports during 1949 totaled 1,095,444 tons, whereas 601,212 tons were exported in the first six months of 1950, indicating an increase in both production and exports when compared with 1949. The industry claims that its greatest difficulty is lack of paper bags. Sales of cement, including exports, totaled 4,500,000 tons during the first six months of 1950. Orders in July and August totaled nearly 2,500,000 tons, but were filled without difficulty by utilizing capacity reserves. The largest quantities exported were destined for Argentina, Venezuela, United States, Brazil, Chile and Mexico.

DAVID MAYNARD, counselor of economic affairs, Athens, Greece, has reported that loans to the cement industry there for the first half of 1950 totaled $4,506,837. The loans to the industry, represented by five companies operating six plants, will give Greece an annual capacity of 540,000 tons of cement.

THE JORDAN GOVERNMENT has been considering the possibility of building a cement plant with an annual capacity of 60,000 tons of cement. The cost of erecting the plant, complete with power plant, houses for employes, and new roads, was estimated at about $2,800,000. The original plan was that the government would provide one-third of this sum, a British firm one-third, and private investors one-third. According to the engineering survey, all necessary raw materials for cement production can be found in sufficient quantities in Jordan, but obtaining cheap fuel oil is presenting some difficulties. The government had hoped to purchase fuel oil from local distributors at specially reduced prices, but at present this possibility appears unlikely. Another alternative is that the cement plant might use as fuel the crude oil to which the government is entitled under its agreement with the Tapline Co. However, the type of plant that could use this fuel is understood to be very expensive. A third possibility is that fuel oil be produced locally, but so far the government has been unsuccessful in interesting any foreign firm in assisting in building a refinery.

These reports were taken from *Mineral Trade Notes*, February, 1951.

Freight Allowances

A COMMENTARY ON freight allowances and equalizations, written by H. G. Huhn, recently appeared in the publication *Distribution Age*. It brings out important phases of the problems which have not been previously analyzed. Among some of the subjects covered in the article are: Auction Prices; Bid and Contract; List and Discount Method; The Farmer's Market; Negotiated Prices; Buyer vs. Seller; Equalizations and Freight Allowances; Delivered Price; F.O.B. Plant; and Base Point Equalization. Reprints of the article may be obtained by writing to H. G. Huhn, 326 N. Court St., Crown Point, Ind. Price per copy is $1; for 10 or more, $.75 each.

Canadian Gypsum

A RECENT BOOKLET issued by the Canadian Department of Technical surveys, Mines Branch, Ottawa, Canada, describes recent investigations into the beneficiation of Canadian gypsum. The booklet was written by A. R. MacPherson, Industrial Minerals Division, and it is designated as Memorandum Series 111, November, 1950.

The article deals with the conducting and results of a number of tests and surveys carried out during the past two years by the Mines Branch of the Department of Mines and Technical Surveys at the request of several producing firms and for the benefit of the industry as a whole. In recent years the gypsum industry of Canada has shown a very definite and fast-growing interest in the possibilities of beneficiation of the somewhat low-grade ores that constitute the greater part of the raw material now available from economically workable deposits in central and western areas.

The Dominion is well supplied with large gypsum deposits which are situated in eight of the ten provinces. Some of the deposits have not been thus far utilized, however, because of their distant location with regard to centers of population or to rail lines or water transportation. The largest of the gypsum deposits are in Nova Scotia, and the products of these deposits are chiefly exported to the United States. Many of the deposits are ideally situated at tide water so that shipments may be made to cities on the Atlantic seaboard.

Deposits in New Brunswick are far less extensive than those of Nova Scotia, and they are currently being utilized solely for the Canadian market. Ontario deposits are relatively impure and contain from 15 to 25 percent dolomite as well as small amounts of silica and clay. In Manitoba the deposits are in the central part of the province around Lake Winnipeg and they are situated on or near rail lines. Several good gypsum areas have been discovered in British Columbia, but these are in a mountainous country and quarrying operations are expensive.

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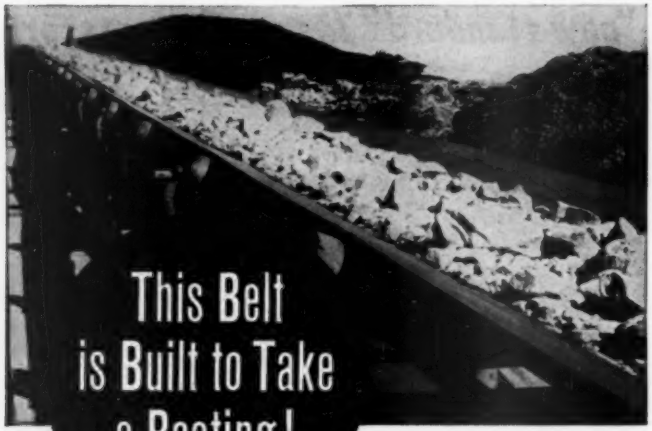
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You get the same kind of "built-in" quality, the same extra wear, from Hewitt-Robins Monarch® Transmission Belting. All plies are straight-laid under uniform tension for longer flexing life and minimum stretch. No folds or seams, either . . . you can apply either side to the pulley . . . *actually double its active life!*

These two Hewitt-Robins belts make a great team in stone crushing plants, quarries, mines—wherever there's no time to *baby a belt.* Call your Hewitt Rubber Distributor (listed in the classified 'phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

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Sulfate Susceptibility Test

THE NATIONAL BUREAU OF STANDARDS recently published a technical report concerning a rapid test for accurately measuring the susceptibility of portland cements to attack by sulfate ground waters, as developed by W. C. Taylor and R. H. Bogue. The report states that the new procedure, which determines the extent to which aluminates in the cement can react with the sulfate ions present, not only reduces the time required for the test, but also provides more valid results than methods previously used.

Where deterioration in a concrete structure occurs, it appears to be due principally to a reaction between the sulfate ions in the ground water and the aluminate ions in the cement. In the presence of calcium hydroxide, crystals of calcium sulfoaluminate are formed, resulting in a volume increase of about 227 percent which may cause cracking and splitting of the structure. Resistance to this type of deterioration may be induced either by the chemical nature of the cement or the physical character of the paste. But improvement in structure merely slows down the rate of attack; for long-range resistance, a cement must be used whose chemical composition makes it naturally resistant.

The older method of testing sulfate resistivities required an excessive amount of time, and the physical character of the specimen often had a pronounced effect on the results. The test developed by the Bureau is made on portions of the cement rather than on specimens of the paste, thus making it possible to evaluate correctly the inherent resistance of the cement to sulfate action as distinguished from the physical effects due to the nature of the specimen.

This test measures the amount of sulfate removed from the solution in a definite time when a small sample of the cement (adjusted to a known sulfate content) is continuously shaken with a saturated lime-water solution. In the early states, the reaction proceeds rapidly but gradually diminishes until, after six hours, the concentration of sulfate in the solution changes so slowly that it can be measured with very little error. The difference between the original SO_3 content of the mixture and that of the liquid at six hours is then calculated as percentage of the SO_3 originally in the cement and is designated "sulfate reaction value."

Results of the test indicate that a cement having a sulfate reaction value up to 50 can be expected to have considerable resistance to sulfate attack; the lower the value, the greater will be the resistivity of the cement. Sulfate reaction values between 50 and 65 are somewhat on the borderline and structures made of these cements may be durable in sulfate exposure if they are dense, impermeable and free of other disintegrative agents. Good workmanship is an absolute necessity in this range of cements,

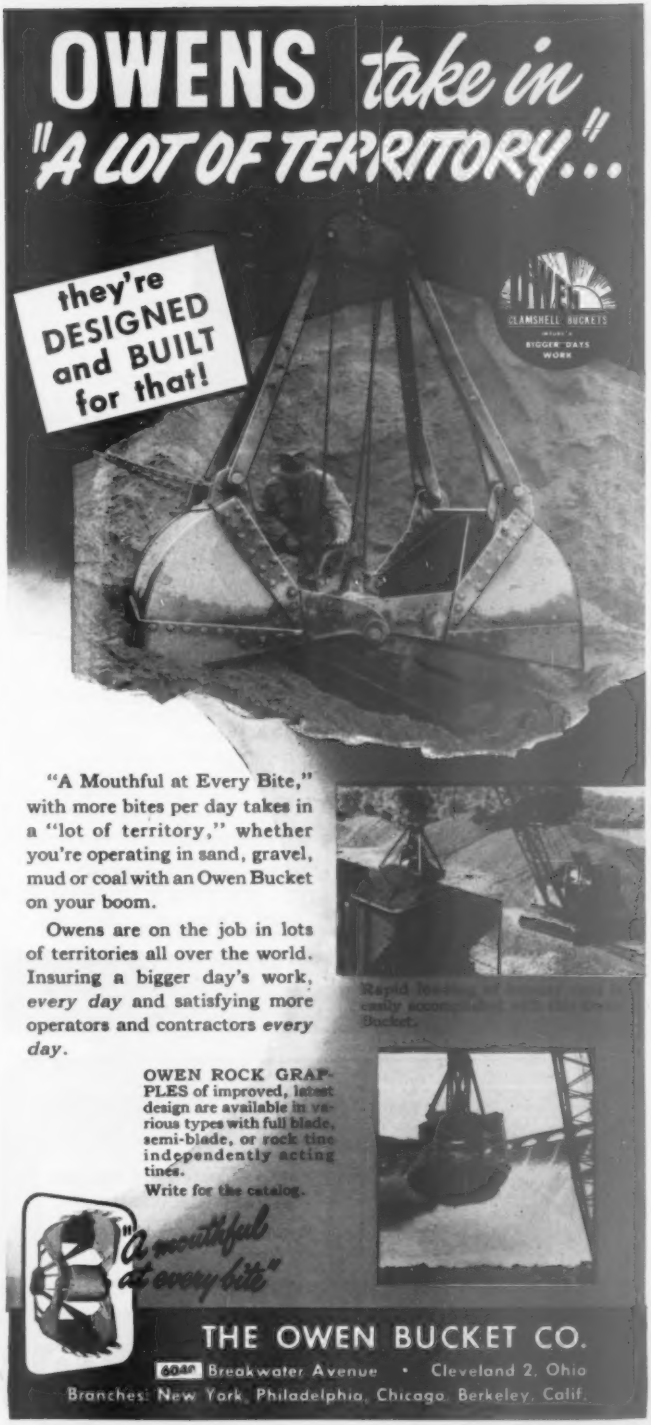
and it is suggested that air entrainment might be beneficial. Cements having a sulfate reaction value above 65 can be considered relatively nonresistant to sulfate attack.

Status of Exports of Foreign Cement

ECONOMIC COOPERATION Administration recently issued a report concerning the limited availability of foreign cement. The report stated that Western Europe can supply the United States in the next few months with substantial quantities of cement, but also pointed out that European cement supplies would be only a "stopgap" measure. It is predicted that by the end of this year, Western Europe's own growing defense needs will be using up nearly all of its own cement production. Further increases in European cement production are being limited by two shortages—shortage of kraft paper, which is used to make bags, and the shortage of coal. However, since most U. S. cement producers are expanding their output, it is believed that the American need for foreign cement is only temporary.

At the present time, European sources are considered particularly valuable for meeting U. S. east coast needs, as prices are comparable and transatlantic shipping costs compare favorably with intra-U. S. railroad shipping costs from cement-producing areas.

Before World War II, Marshall Plan countries exported about 280,000 tons of cement annually to the U. S., the chief suppliers being Belgium, Denmark and Germany, in that order. The Marshall Plan survey of the present availability of cement in Western Europe for export disclosed the following figures: In Belgium, production is at maximum capacity of about 5,600,000 tons per year, with approximately 3,000,000 tons available for export in 1951; the United Kingdom 1951 cement production is expected to reach about 10,000,000 tons but, due to Britain's own rearmament program, only a small percentage of the cement will be available for export; Italy estimates it will have at least 10,000 tons of cement per month available for export; Denmark is in the process of raising cement production from about 850,000 tons per year to 1,100,000 tons, of which at least part of the increase will be available for export to the U. S.; Norway and Sweden face the problem of increasing production in order to export cement—most of present production is being consumed at home; Dutch cement production is lagging behind heavy domestic demands. The Federal Republic of Germany, according to E.C.A., offers the greatest potential source with current production estimated at about 9,000,000 tons a year as against a rated capacity of about 15,000,000 tons, and with present domestic consumption being a little less than 7,500,000 tons.



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Serialization Filing Date

THE DEFENSE MINERALS ADMINISTRATION has announced that due to a delay in sending out the applications for serialization (Form MF-100), the last date for filing an application has been extended from June 1, to June 31, 1951.

To Move Slag Plant

INSULATION PRODUCTS, LTD., Hamilton, Can., has announced that it will move its slag plant from the Steel Co. of Canada plant to Port Colborne, Ont. The plant, which produces lightweight aggregate from slag for lightweight building block, is expected to begin production at its new location sometime in May. The company will maintain its offices in Hamilton. John C. K. Stuart is vice-president and general manager.

Book on Talc

WHITTAKER, CLARK & DANIELS, INC., New York, N. Y., recently announced the publication of a new talc catalog. The book contains three sections, entitled: "Uses," "Data," and "Specialties."

The introduction describes the various kinds of talc, their sources and usage in all types of industry. All the talcs are indexed by grade number and geographical source.

Section I, on "Uses," gives the importance of the various grades of talc to specific industries. These uses are listed in encyclopedic arrangement. For each use listed, the best grade of talc for that particular need is given. In Section II, "Data," the talc types are numbered, indicating the talc grade. Typical physical and chemical properties for the complete listing of Whittaker talcs are given on separate pages, in numerical order, for each grade. The list describes about 150 different talcs.

The section on specialties describes various pyrophyllites, soapstones, wonderstone, Softex fillers, special talcs, and Clover Brand Soapstone (talc) crayons for metal workers. Two final indices list "Talcs by Geographical Origin" and "Talc by Special Properties."

Bearing Maintenance Publication

THE ANTI-FRICTION Bearing Distributors Association has begun the publication of a new service—the Bearing Maintenance Report. The purpose of the report is to provide a handy reference source that will give ready answers to the many questions arising on current problems of bearing maintenance, to announce the latest developments in new bearings and bearing applications, and any current improvements in the techniques of removal and reinstallation.

Since most of the "down time" is lost through bearing failure due to faulty maintenance practices, the A.F.B.D.A. believes this new publica-

tion will considerably lessen industrial loss if it can be placed in the hands of all those concerned with keeping production rolling during this time of emergency.

The A.F.B.D.A. states that this maintenance report is not a news magazine and has no opinions, but contains all the facts that could be dug out of the industries and laboratories of the country. The reports will be published in pamphlet form. A file folder-type of binder, on company letterhead, will be sent to each bearing user requesting it, for the compiling of succeeding issues. The reports and binder may be secured by writing to The Anti-Friction Bearing Distributors Association, 1900 Euclid Ave., Cleveland 15, Ohio.

To Use Blended Cement

THE CIVIL ENGINEER CORPS of the United States Navy has been instructed in recent circular letters from headquarters to take the following measures:

"(1) Specifications of the construction agencies of the Department of Defense shall be revised to permit the use wherever feasible of cement blends and/or puzzolanic materials in concrete mix.

"(2) Specifications of the construction agencies of the Department of Defense shall be revised to permit the use of all natural cements where feasible.

"(3) Specifications of the construction agencies of the Department of Defense will require minimum cement usage to meet the requirement for strength, durability, density, and other essential characteristics as imposed by field conditions.

"(4) Designs of concrete batches will be such as to yield realistic minimum strength.

"(5) The size of concrete structural members will be limited to realistic minimum dimensions.

"(6) Design of roads, airfields, parking areas, etc., will continue to stress the use of local available materials, other than concrete, for base courses.

"Other conservation measures recommended by BuDocks are:

"(1) Use as large size coarse aggregate as practicable.

"(2) Where high-early-strength concrete is required and high-early-strength cement is not available, use calcium chloride in amounts not exceeding 2 percent by weight of the cement in lieu of additional cement except in concrete of elevated temperatures or with cement of high alkali content.

"(3) Use masonry cement when available for masonry mortar in lieu of portland cement.

"(4) Use Keene's cement plaster in lieu of cement plaster in interior of buildings except for fireproofing.

"(5) Use small-section members of high-strength concrete where feasible."

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For small plants!

Versatile truck-mounted Schield Bantam dragline or shovel *costs less than half the price of bigger machines* . . . digs or loads up to 90 cu. yds. of material per hr. . . . has high-speed mobility to go anywhere, over paved roads or cross country, for stripping, stockpiling, loading trucks, etc. Can also be rented out part time to counties or local contractors for extra income.



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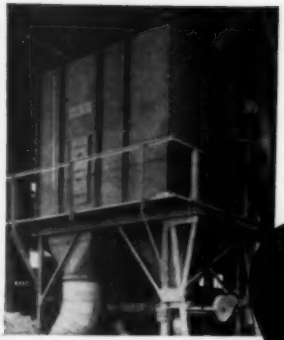


Illustration above shows a Sly Dust Filter in the sack house of a cement plant. Several dust pipes enter the fan side of the filter. The exhaust fan is located on the floor below filter. A screw conveyor automatically and continuously removes the collected cement.

Pioneers and Leaders in DUST CONTROL

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Sly Dust Filters collect dust generated in such operations as crushing, grinding, screening, conveying, loading, separating, and mixing — Saving valuable materials, adding to net income.

Sly Filters are saving money for their users by providing cleaner plants, better working conditions, greater production, less cleaning up (interiors, roofs, surroundings, etc.), and cleaner products, which sell better. Thousands of installations.

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Sly Dust Filters get all the dust by filtration through cloth. They offer you:

1. **Greater filtering capacity because of more filtering cloth.**
2. **Taut bags (patented) save power and improve dust removal.**
3. **Bags more easily replaced.**
4. **Automatic control (any degree) minimizes or entirely removes the human factor.**
5. **Simpler shaker mechanism results in savings in maintenance and operation.**

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FINANCIAL

WARNER CO., Philadelphia, Penn., reports earnings for the years ended December 31, as follows:

	*1950	1949
Net sales, etc.	$19,746,193	$18,047,260
†Net profit	$3,212,558	2,632,953
Earn., com. share	$6.77	$5.55
No. of com. shares	474,329	474,329

*Preliminary.
†After income taxes, including excess profits tax in 1950.
‡After crediting $940,462 gain from sale of property.

GIANT PORTLAND CEMENT CO., Philadelphia, Penn., reports the following statement of income for years ended December 31:

	1950	1949
Net sales	$ 5,396,248	$ 4,451,265
Cost of sales	3,433,995	3,131,603
Selling, etc., exp.	416,106	407,229
Operating profit	1,546,147	912,433
Profit, assets sold	*dr* 588	517
Other income	1,457	8,944
Total income	1,547,015	921,894
Interest	9,724	19,214
Other deductions	—	922
Income taxes	632,500	393,750
Excess profits tax	77,500	—
*Net income	827,291	508,008
Earn. surp., 1-1	741,081	361,093
Dividends	317,882	128,021
Earn. surpl., 12-31	1,250,490	741,081
Earn., com. share	$0.84	$0.59
No. of com. shares	982,351	853,490

*After depreciation and depletion: 1950, $147,676; 1949, $132,913.

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., for the years ended December 31, has reported the below statement of income:

	1950	1949
Net sales	$15,636,107	$13,373,216
*Net income	732,908	397,790
Earn. com. share	$0.91	$0.45
No. of com. shares	736,967	736,973

*After Federal income taxes.

Working Capital, Dec. 31:

	1950	1949
*Current assets	$ 3,571,349	$ 3,006,197
Current liabil.	1,851,865	1,508,833
Net curr. assets	1,719,484	1,497,364

*Includes cash: 1950, $1,236,791; 1949, $785,656.

THE KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, has reported a net profit of $1,148,054, or $3.72 a share, for the year ended December 31, 1950. This compares with $992,902, or $2.99 a share for the preceding year.

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., on December 1, 1950, redeemed the entire outstanding $1,250,000 first mortgage 3¼ percent bonds, due 1953. The company reports that redemption was completed at a cost of $1,282,291, reflecting redemption price of 101½ and accrued interest.

KEYSTONE PORTLAND CEMENT CO., Philadelphia, Penn., announces that under the plan of recapitalization which became operative on August 24, 1950, outstanding 40,000 no par common shares were exchanged on a share-for-share basis for new no par common stock with stated value of $12.50 a share. Of 17,718 preferred shares outstanding at June 30, 16,376 shares were deposited under the plan and exchanged for 98,256 new common shares, 1032 preferred shares were purchased by the company at $166.33 a share, and the remaining 310 shares were called for redemption as of November 3, at $105 plus accumulated dividends of $61.99 a share. At pres-

ent, authorized capital stock consists of 300,000 no par common shares, of which 138,256 shares are issued and outstanding.

KEYSTONE PORTLAND CEMENT CO., Philadelphia, Penn., lists an income account for the years ended December 31, as follows:

	1950	1949
Net sales	$ 5,601,567	$ 5,084,302
Costs & expenses	3,743,816	3,346,618
Deprec. & deplet.	171,313	161,090
Operating profit	1,686,438	1,576,595
Other income, net	115,429	23,635
Total income	1,801,867	1,600,230
Income taxes	780,000	627,000
Excess prof. tax	115,000	—
Net profit	906,867	973,230
Earn. surp., 1-1	1,270,672	992,064
Preferred divs.	116,583	692,384
Common divs.	276,512	—
Pfd. prem., etc.	548,615	—
Tfr. to com. stk.	292,552	—
Misc. chgs. net	—	2,238
Earn. surp., 12-31	943,278	1,270,672
Earn., com. shares	*$6.56	$20.01
No. of com. shares	138,256	40,000

*Disregarding preferred dividends paid.

GENERAL PORTLAND CEMENT CO., Chicago, Ill., has reported net earnings of $5,907,700 for the 12 months ended December 31, 1950, compared with net earnings of $5,239,900 for the year 1949. Earnings equaled $5.68 per share on 1,039,971 shares of common stock outstanding, compared with $5.04 per share for 1949.

THE ARUNDEL CORP., Baltimore, Md., for the years ended December 31, has reported the following statement of income:

	1950	1949
Net sales:		
Contr. billings	$ 7,526,733	$ 5,428,504
*Commodity	5,442,671	4,573,646
Mar. rent., etc.	127,073	111,626
Total	13,096,477	10,113,776
Oper. expenses	11,118,106	8,936,308
Balance	1,978,371	1,177,468
‡Joint vent. inc.	1,121,257	817,644
Net earnings	3,099,627	1,995,112
Adm. & gen. exp.	847,649	817,610
†Operating inc.	2,251,979	1,177,503
§Div. from affil.	170,000	162,500
Gain asset sold	7,327	102,762
Other income	78,539	30,793
Total income	2,507,845	1,473,558
Int. & debt exp.	57,583	52,582
Fed. income tax	1,100,000	385,000
Net income	1,363,162	1,035,676
Earn. surplus, 1-1	4,561,280	4,073,540
Dividends	657,524	547,936
Earn. surp., 12-31	5,266,918	4,561,240
Earned per share	$3.16	$2.56
Number of shares	438,376	438,376

*Including sales to affiliated company: 1950, $1,625,291; 1949, $1,449,317.

†After depreciation and depletion: 1950, $510,736; 1949, $491,868.

‡Includes dividend received from incorporated venture: 1950, $50,000; 1949, $125,000.

§Equity in net earnings of affiliates: 1950, $316,805; 1949, $309,047.

MARQUETTE CEMENT MFG. CO., Chicago, Ill., has reported the below statement of income for the years ended December 31:

	1950	1949
Net sales	$18,929,546	$18,569,967
Other revenue	1,436,232	1,214,489
Total	20,366,778	19,784,457
Cost of sales, etc.	12,454,124	12,948,755
Selling, etc., exp.	2,342,451	2,341,439
Other expenses	488,726	199,309
Net earnings	5,080,477	4,294,954
Interest	133,943	135,414
Income taxes	2,154,828	1,667,602
Net income	2,791,706	2,491,939
Earn., pfd. share	$.11	7.17
No. of pfd. shares	65,000	65,582
No. of com. shares	320,000	320,000

MODERN SAND AND GRAVEL CO., Madison, Wis., increased its stock from 600 shares, no par value, to 1500 shares, no par value.

FORDYCE GRAVEL CO., San Antonio, Texas, recently increased its capital stock to $750,000.

For lower grinding costs, higher grinding efficiency . . .



U·S·S LORAIN ROLLED PLATE LININGS are designed for quick and easy handling...save hours of installation labor, keep mill down-time to a minimum. And the rugged strength of the rolled steel from which Lorain Linings are made enables you to use a plate of reduced thickness . . . thereby increasing usable diameter of your mill, boosting output.

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There's a length, diameter and thickness of Lorain Plate to fit any type of mill. Available through leading mill manufacturers whose names will be furnished upon request.

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UNITED STATES STEEL

GENERAL

Model 310 boosts profits in quarry work by speeding output and cutting costs



This GENERAL Model 310 Shovel working in the quarry of J. Miller Eshelman at Landisville, Pennsylvania, is modern from treads to boomtip . . . and feature after feature is designed to boost profits by speeding output and reducing costs.

All motions are air controlled, including the dipper trip. Patented Air Tube Clutches activate swing, hoist and retract motion with steam-like smoothness and eliminate continual clutch adjustments by automatically compensating for gradual wear of the friction discs.

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MANUFACTURERS NEWS

Link-Belt Co., Chicago, Ill., announces that Ralph W. Rausch has been appointed consulting engineer at the Pershing Road plant. He was formerly chief engineer and will be succeeded in this position by Joseph J. Richard, who has been executive assistant chief engineer since 1950.

Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh, Penn., has announced the appointment of J. P. Cullen as West Coast manager of the construction equipment department, with offices in San Francisco. Louis J. Sarosdy, who originally opened the West Coast office, will resume his duties in Pittsburgh as chief engineer of the construction equipment department and sales manager of the heavy steel forms department.

GMC Truck & Coach Div., General Motors Corp., Pontiac, Mich., has appointed Loren T. Flynn as manager of government sales, truck division. T. L. Harris has been named manager of distribution, truck division, and George R. Oliver has been transferred to the government sales section of General Motors Corp.

The Heil Co., Milwaukee, Wis., has announced the appointment of John Barclay as general sales manager to succeed William E. Simons who has left the company. William Schumacher, sales representative at Hillside, N. J., has been named to succeed Mr. Barclay as district sales manager for that area. Robert Miller, district sales manager at Kansas City, Mo., has been made sales manager of the road machinery division. He replaces Henry Giles who has become an active member and general manager of J. S. Innes, Ltd., Heil road machinery distributors at Toronto, Canada. Ralph Nitz, formerly sales representative at Dallas, Texas, has been appointed district sales manager at Kansas City.



John Barclay

Athey Products Corp., Chicago, Ill., announces the appointment of Worthington J. Gross as manager of the governmental division at Washington, D. C., and Bert C. Landstrom as district representative for the seven Eastern states and the northeastern part of Canada.

Western Machinery Co., San Francisco, Calif., announces that H. N. How, president, has accepted the invitation of Secretary of Interior Oscar Chapman to serve on the Advisory Committee on Mining Machinery in Washington, D. C.

Gardner-Denver Co., Quincy, Ill., has appointed C. H. Rieman as manager of the mining division. He succeeds the late A. W. Dale, who passed away in December. Mr. Rieman start-

ed with the company as a salesman in 1937, and has been district manager at Duluth since 1948.

The Hays Corp., Michigan City, Ind., has appointed Jack J. Tipton as chief project engineer. He was formerly project engineer for combustion control. Mr. Tipton is a graduate of Pennsylvania State College with a B.S. degree in electrical engineering. Before joining the Hays Corp. in 1945, he was sales engineer for the J. W. Murphy Co., Chicago, Ill.

Industrial Power Div., International Harvester Co., Chicago, Ill., has announced the retirement of D. B. Baker, manager of industrial power engineering, after 47 years of service with the company.

SKF Industries, Inc., Philadelphia, Penn., announces that Norman A. Strang has been appointed advertising manager to succeed Robert C. Byler, who passed away recently. Born in Pleasantville, N. J., Mr. Strang was educated in Philadelphia, Penn. He joined SKF as a sales clerk in 1940, later supervising the preparation and production of direct mail, catalogs and other sales promotion material. In 1942, he enlisted with the U. S. Coast Guard, seeing action in the North Atlanic as well as taking part in the six South Pacific invasions from Kwajalein to Okinawa. He returned to SKF in 1945 as a sales promotion writer and five years later was appointed assistant advertising manager.



Norman A. Strang

H. K. Porter Co., Inc., Pittsburgh, Penn., has announced the appointment of J. R. Lewis as assistant general sales manager of the Quaker Rubber Corp., Philadelphia, a division of the company. Mr. Lewis has been with Quaker since 1940, having held positions as Philadelphia district sales manager and assistant sales manager.

American Wheelabrator & Equipment Corp., Mishawaka, Ind., has elected Stanley F. Krzeszewski as vice-president, in addition to his duties as factory manager. He joined the company in 1945 and has successively held the positions of foreman, factory superintendent, and plant manager.

Willson Products, Inc., Reading, Penn., announces the election of Thomas A. Willson, Jr., as vice-president, in addition to his duties as assistant secretary.

Lewis-Shepard Products, Inc., Watertown, Mass., has established headquarters in North Bergen, N. J., for handling sales and service requirements in the New York City and New Jersey areas.

Alloy Rods Co., York, Penn., has announced the appointment of E. R. Walsh, III, as general sales manager. He has been district sales manager for the past several years.

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Now — there's no tricky, complicated specifications involved in cutting wire rope costs to the ultimate low. Just say Tuffy to your distributor. Tuffy is the trade-marked name of a growing family of wire ropes, each especially designed and constructed to better serve a special purpose.

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for SHOVELS DREDGES CRANES CONVEYORS

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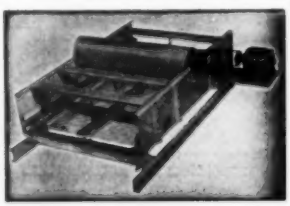
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Write today for prices, and Catalog No. 109 on Screens and Screening.

UNIVERSAL VIBRATING SCREEN CO
RACINE — WISCONSIN

St. Regis Paper Co., New York, N. Y., has announced the appointment of Edward R. Gay as executive vice-president. He was formerly head of the kraft and multiwall bag operations as well as manufacturing in the printing paper division. W. R. Adams has been named vice-president in charge of all pulp and paper manufacturing, and T. H. Cosford, a director in charge of Canadian operations, has been made a vice-president. Other vice-presidents appointed are R. P. Bushman, in charge of filling machines; J. B. Eakin, in charge of purchasing; Albert Ernest, in charge of Southern timberlands and pulpwood; Willard Hahn, in charge of multiwall bag manufacturing; and C. H. Hartman, in charge of multiwall bag development. In addition, Gurden W. Wattles was named to the executive committee to fill the vacancy created by the death of James H. Allen; Horace R. Lamb, a member of the executive committee, has been named general counsel; and J. McHenry Jones has been made southern counsel. H. F. Stevens has been appointed assistant comptroller.



Edward R. Gay

Arkell & Smiths, Canajoharie, N. Y., announces that William Wellings, Jr., has been placed in charge of paper procurement, with offices in New York, N. Y. He joined the Wellsburg plant in 1938 as office manager and purchasing agent and, in 1948, was transferred to Mobile, Ala., in a similar capacity.

Koppers Co., Inc., Pittsburgh, Penn., has announced the appointment of Donald MacArthur as assistant manager of the sales department, Central staff. He was formerly sales manager in the Granite City office. T. H. Cable, who has been with the sales department since 1949, has been named manager of the international product sales section of the department.

Truck-Trailer Manufacturers Association, Inc., Washington, D. C., announces that E. J. Lucas, a past president of the Association and sales manager of the Kingham Trailer Co., Louisville, Ky., has been appointed chief of the Trailer Section, Automotive Branch, Transportation Equipment Division, National Production Authority, Washington, D. C.

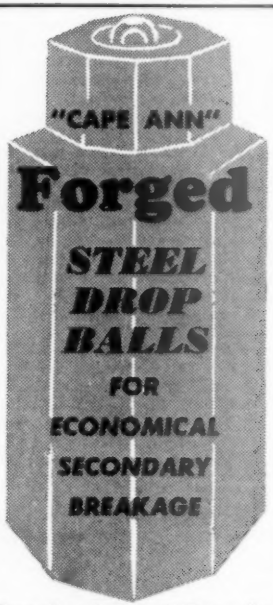
Westinghouse Electric Corp., Pittsburgh, Penn., announces that Mark W. Cresap, Jr., management consultant, has joined the company as a vice-president and assistant to Gwilym A. Price, president. Mr. Cresap is co-founder of the management consultant firm of Cresap, McCormick and Paget, New York, N. Y., and Chicago, Ill.

Joy Mfg. Co., Pittsburgh, Penn., has announced plans to build a research center in Indiana County, Penn., about 45 miles northeast of Pittsburgh, which will feature an experimental mine in addition to a laboratory and work shop. The experimental mine, which is the first in the industry, will not produce any commercial mineral product but will be operated exclusively for testing mining machinery and equipment. The project is under the technical supervision of Dr. T. H. Troller, vice-president in charge of engineering; and A. Lee Barrett, research engineer. Engineering and site preparation are already in process, and completion of the research center is scheduled this fall.

The B. F. Goodrich Co., Akron, Ohio, has started construction on additional buildings for the research center in Brecksville, Ohio, which are expected to be ready for occupancy in October, 1951. Announcement has also been made that construction of its Type 88 air hose has been changed from cotton to rayon fabric reinforcement, effecting a decrease in weight and an increase in flexibility of the hose, according to the manufacturer.

Chase Bag Co., Chicago, Ill., has appointed F. H. Ludington, Jr., as assistant vice-president, with headquarters in New York, N. Y., where he will assist C. S. Sheldon, vice-president and treasurer in charge of manufacturing, production and engineering. Mr. Ludington was formerly manager of the Philadelphia branch.

Gould-National Batteries, Inc.,



Cape Ann Anchor & Forge Co.
Post Office Box 360
Gloucester - Massachusetts

Trenton, N. J., has announced the company's new "Plus-Performance Plan," which is devised to help industrial battery users get more production and greater performance from their storage battery equipment. It consists of an integrated conservation program based on applicable charts, manuals, and articles pertaining to particular users' problems. A booklet is available upon request which describes the plan in detail.

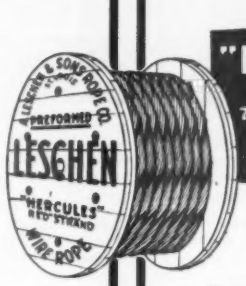
Hewitt-Robins, Inc., New York, N. Y., announces that Francis B. Speaker has been appointed chief of the Maintenance, Repair and Operations Branch of the Requirements Division, Defense Minerals Administration, Washington, D. C. Mr. Speaker served in the Mining Division of the War Production Board during World War II.

Borg-Warner Corp., Chicago, Ill., has announced the appointment of G. E. Campbell as assistant works manager and Donald A. Sutherland as industrial sales manager of the Pesco products division, and E. J. Foltz has been promoted to industrial relations manager. Andrew W. Rose has been named assistant general manager of the Warner gear division, Muncie, Ind. L. A. Black, who has been purchasing agent since 1938, has been named director of purchases. T. J. Ault, previously assistant purchasing agent, has been advanced to the post of purchasing agent. L. T. Druck has been appointed assistant purchasing agent of the productive material, and J. C. O'Harra, Jr., has been made assistant purchasing agent of non-productive material. Donald N. Arndt, formerly service sales manager, has been named assistant general sales manager of the Marvel-Schebler products division. Carl R. Brick, who has served for several years as the corporation's industrial training consultant, has been appointed assistant to Roy C. Ingersoll, president.

Bemis Bro. Bag Co., St. Louis, Mo., has completed the rebuilding and enlarging of its Seattle, Wash., plant which was badly damaged during the earthquake of April 13, 1949. Announcement has also been made that the Bemis Paper Bag Co., with plants at Vancouver, Washington, and Wilmington, Calif., a wholly owned subsidiary of the Bemis Bro. Bag Co., has become a part of the parent company.

Worthington Pump & Machinery Corp., Harrison, N. J., has named Edward Barwell as industrial relations coordinator to assist L. C. Ricketss, vice-president in charge of manufacturing. Robert C. Tierney, formerly coordinator in the vertical turbine pump division, will be in charge of the new vertical turbine pump plant at Succasunna, N. J., when it is completed, and A. F. Reinking, formerly assistant sales manager, has been appointed manager of the steam turbine sales division, with headquarters at the Wellsville plant.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the appoint-



"HERCULES"* RED-STRAND
the DEPENDABLE WIRE ROPE *for* TOUGH JOBS
* REG. U.S. PAT. OFF.

Experienced wire rope users have found that they can depend on "HERCULES" (Red-Strand) for the strength... toughness... durability – necessary for consistent, safe, and economical service. Our exacting standards and rigid tests insure these results.

We Invite Your Inquiries

MADE ONLY BY
A. LESCHEN & SONS ROPE CO. 5909 KENNERLY AVE. • ST. LOUIS, MO.
ESTABLISHED 1857
New York 6 · Chicago 7 · Birmingham 6 · Houston 3 · Denver 2 · Los Angeles 21 · San Francisco 7 · Portland 9 · Seattle 4

New... BEAUMONT "BEAUCALLOY" BUCKET ELEVATOR CHAIN



Beaumont "BEAUCALLOY" Chain cuts maintenance costs through great increase in service life. At present test installations these chains have been in operation more than twenty times longer than former malleable iron chain—and still show little sign of wear.

Besides utilizing Beaucalloy, a heat-treated alloy steel, Beaumont developed a new link design which provides additional metal on the barrel where wear occurs. In addition, the chain maintains almost steady contact during rotation on sprocket or traction wheel—reducing wear on barrel, pin and sprocket.

Write—without obligation—for data sheets or for our representative to call.

Beaumont BIRCH COMPANY
1522 RACE STREET • PHILA. 2, PA.
DESIGNERS • MANUFACTURERS • ERECTORS • BULK MATERIAL HANDLING SYSTEMS

Check These Features:

Barrel has extra metal on area receiving wear.

Projecting guards deflect material from chain joints.

Ground finish on pin reduces wear.

Special attachment permits use of new Beaumont Dove-Tail Lock buckets or conventional type "A" buckets.

Unit Type CLINKER COOLER GRATE Saves Assembly Cost



A NEW IDEA IS BORN . . . fathered by a quarter-century of experience in the manufacture of alloy steel castings for cooling equipment.

This improved type of Clinker Cooler Grate is *different* . . . and definitely better . . . because it comes as a completely assembled unit, ready to drop in place without any expense for assembly work on the job. Its unique design permits a saving in weight, insures increased service life and reduced maintenance. Space for air inlets between bars is controlled by the size of small bosses on back of each bar. Bars are screwed up tight in close contact, and kept in place by two Pyrasteel rods, welded at the ends.

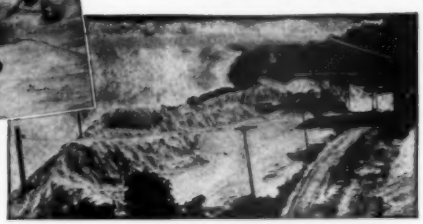
Our customers, including nationally known cement companies, have been using these Clinker Cooler Unit Grates with satisfaction and economy.

Write for details on special types of Alloy Steel Castings.

CHICAGO STEEL FOUNDRY COMPANY
Kedzie Avenue at 37th Street
Chicago 32, Illinois
Makers of Alloy Steel for Over 40 Years

How to solve varied handling problems with a SAUERMAN Power Scraper





(Above) This shows how Sauerman Rapid-Shifting Scraper digs a deep cut in a hill.
(At Right) Small Sauerman Scraper stores and reclaims surplus limestone dust.

HAVE YOU a problem in pit excavation, strip mining, pond cleaning and the like? Then you will find Sauerman Catalog 19-A a valuable guide on how to cut costs on this type of work with a power drag scraper machine. Operating principles explained with special reference to Sauerman Rapid-Shifting Scrapers.

Perhaps you also have a stockpiling problem. If so, you need the new Sauerman Catalog 19-E which is for all practical purposes a textbook on how to store and reclaim bulk materials with a scraper. About 100 layouts are shown, handling everything from ash to heavy ores. Capacity charts and cost data for the engineer.



These two catalogs free on request.

SAUERMAN BROS., INC.
530 S. CLINTON ST., CHICAGO 7, ILL.

ment of Arthur B. Kinley and Wayne L. Smith as sales representatives of the general machinery division. Mr. Kinley has been assigned to the Spokane office where he will specialize in selling equipment for the cement, mining and rock products industries. Mr. Smith is now with the Denver district office.

Cleveland Vibrator Co., Cleveland, Ohio, has completed another addition to its plant, which marks the third expansion in the last five years. The new addition will house new automatic screw machines used for vibrator production. A conveyor line has been installed down the center of the building, also automatic spray painting facilities.

Transitier Truck Co., Portland, Ore., manufacturers of Hi-Duty lift trucks, has appointed W. T. Billard, Inc., Los Angeles, as Southern California distributor, and E. C. Buehrer Associates, Inc., San Francisco, as Bay Area distributor.

Automatic Steel Products, Inc., Canton, Ohio, has announced the election of Curtis Franklin as chairman of the board of directors and Ralph H. Everett as a director for a term of three years.

Caterpillar Tractor Co., Peoria, Ill., has promoted E. C. Sonneman to assistant export divisional manager. His new position will be that of assistant manager of the Latin American division which includes the countries of Central and South America.

Signode Steel Strapping Co., Chicago, Ill., announces that Herbert F. Gunnison, Anchorage, Ky., has been appointed sales representative in the Louisville area which includes Louisville, most of Kentucky and part of southern Indiana. C. A. Carter, formerly with the Canadian Steel Strapping Co., Vancouver, B. C., a subsidiary, has joined the Seattle office and will cover Washington, northern Idaho and Montana.

The Euclid Road Machinery Co., Cleveland, Ohio, has moved the Minnesota sales and service branch to Highway 169 West in Hibbing, with J. W. Bloomquist as manager. D. R. Anderson is in charge of parts and Otis Hadlock is service manager.

Worthington Pump & Machinery Corp., Harrison, N. J., announces that William F. Weinreich, formerly assistant superintendent of machine shops at the Buffalo plant, has been placed in charge of the Oil City, Penn., plant, recently acquired from the National Transit Pump & Machine Corp. which was liquidated. He will also be assistant to Austin C. Ross, vice-president, who is in administrative charge of the Oil City plant. David S. Gibson, who has handled various assignments in the general sales department, has been appointed assistant to the vice-president of purchases and traffic.

Dravo Corp., Pittsburgh, Penn., announces that the contracting division has been awarded first prize of a bronze plaque for the best accident

prevention record of 1950 with a total of 1,491,808 manhours worked with only eight lost-time injuries, in a contest sponsored by the Associated General Contractors of America, Inc. The company also won first prize for the best accident prevention record among local large contractors from the Constructors Association of Western Pennsylvania.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces that W. A. Roberts has been elected president of the company, succeeding the late Walter Geist. W. C. Johnson, vice-president in charge of the general machinery division, has been named executive vice-president for the entire company. R. S. Stevenson, general sales manager of the tractor division, has been appointed vice-president in charge of the tractor division. J. L. Singleton has been named vice-president in charge of the general machinery division; A. W. Van Hercke, vice-president in charge of engineering for the tractor division; John Ernst, vice-president in charge of tractor division manufacturing; and Fred Mackey, vice-president in charge of general machinery manufacturing.



W. A. Roberts



W. C. Johnson

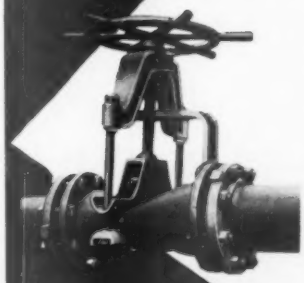
Mr. Roberts started his career with Allis-Chalmers in 1924 as a salesman for the Wichita, Kan., branch. He became vice-president in charge of the tractor division in 1944, and was elevated to executive vice-president in charge of that division in 1947. One year later he became a director and a member of the board's executive committee.

Mr. Johnson has been with the company since 1924, when he started as a machinist's helper. He served for a while in the field and sales organizations, and became vice-president of the general machinery division in 1944, executive vice-president in 1947, and a director in 1948.

Mr. Stevenson, who succeeds Mr. Roberts as head of the tractor division, has been associated with the company since 1933. He became general sales manager of the tractor division last year.

Air Reduction Co., Inc., New York, N. Y., announces that Dale D. Spoor, manager of the equipment sales department, has been granted a leave of absence to serve with the National Production Authority in Washington, D. C.

Massco-Grigsby
RUBBER PINCH VALVES
Resist Abrasive Pulps



Severe abrasion quickly destroys metal valves while these rubber pinch valves show little wear. They shut tight, even on solid particles. There are no packing glands, and freezing does not damage the patented hinged design sleeve. Sizes 1" to 12" available for continuous pressures up to 100-150 psi.

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Offices in Salt Lake City, El Paso, 1775 Broadway, N. Y. C.

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TY-ROCK SCREENS
BALANCED RUGGED



4' x 12', two surface
Type F-600 Ty-Rock Screen

THE W. S. TYLER COMPANY
CLEVELAND 14, OHIO
Manufacturers of Woven Wire Screens and Screening Machinery

THERE'S MORE THAN MEETS THE EYE IN

HAMMOND *Multi-Wall* BAGS





Photo shows "tubes" coming off large tuber, from which they are conveyed to sewing machines, where they are made into *Sewn Type* Multi-Walls.

Satisfied customers in the cement and rock products industries know that all multi-wall bags are not alike. The combined efforts of progressive management, conscientious and thoroughly trained personnel, and expert sales engineers who thoroughly understand the problems of shipping hundreds of products—are the primary reasons for the superiority of Hammond Multi-Wall Bags. *Write for booklet—"To Serve You Better with Hammond Multi-Wall Bags."*

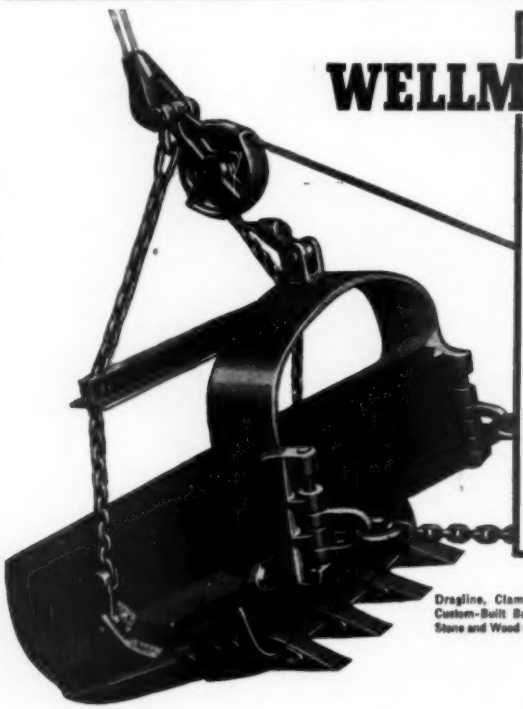
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MORE YARDAGE PER DAY

● Elimination of excess materials and careful weight distribution permit rapid, rhythmic operation of Wellman Dragline Buckets. Operators can cover a wider digging radius with this streamlined bucket.

Built of special alloy steel, using strong welded design, Wellman buckets provide strength and stamina for long-term economy. Perforated designs also available. You'll do better with Wellman.

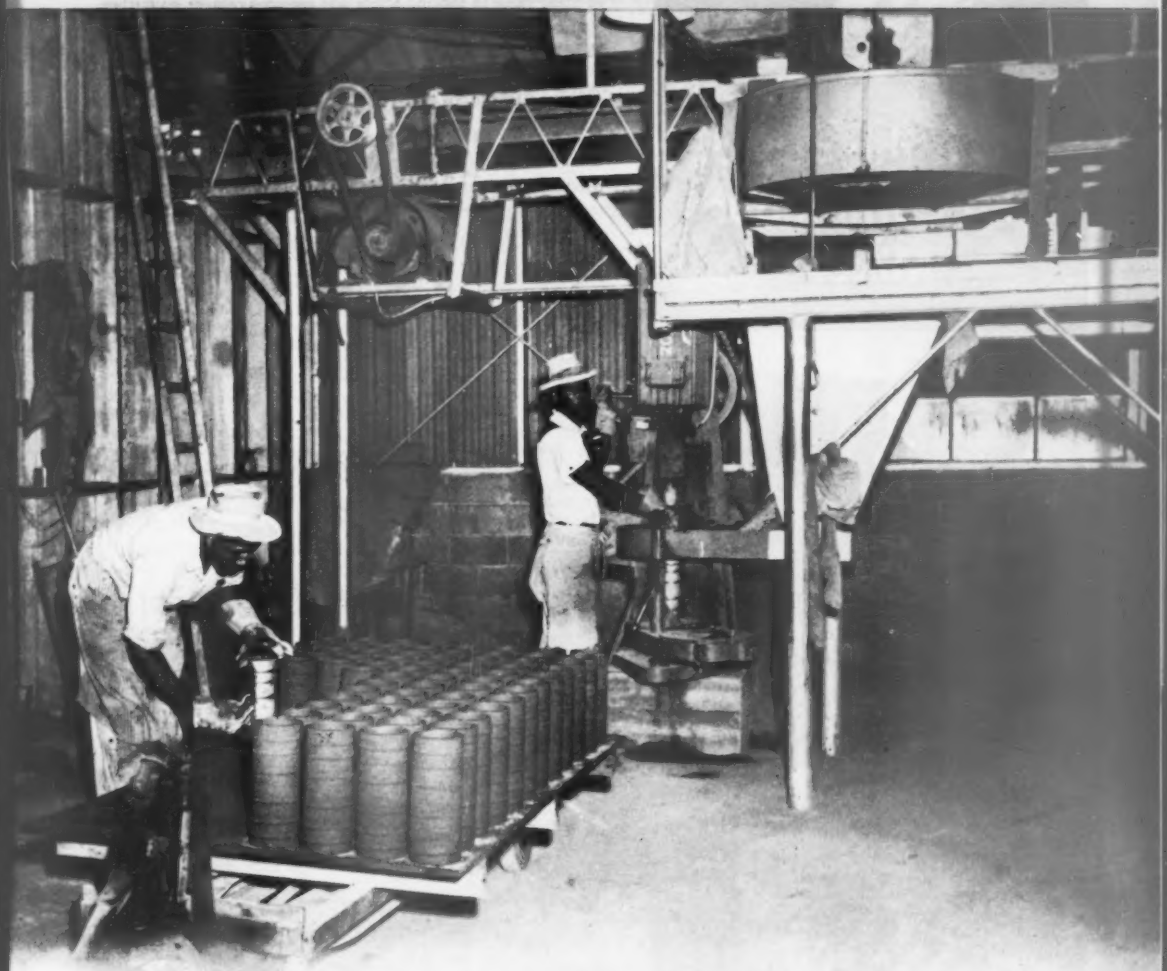
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CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS — READY-MIXED CONCRETE



Producing machine-made drain tile

Every dog has its day—



This is the day of The Continuous Mixer

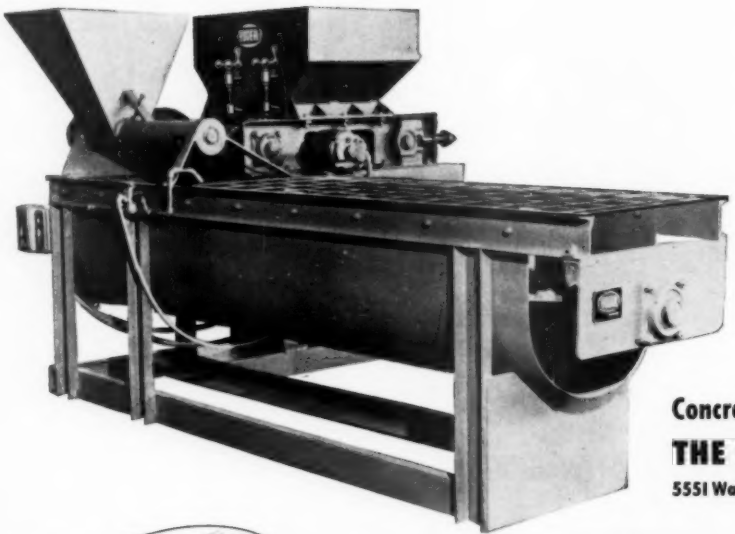
● Not any continuous mixer, of course, but the Yoder. It will make you forget everything you have been told, and everything you *think* you have known about continuous mixers.

Because of several new and revolutionary features, the Yoder has brought mixing under closer control, made results surer, operation easier and simpler.

Vibrating, non-clogging, positive feed is only one of these features. It reduces aggregate, regardless of moisture contents, to constant volume—a positive improvement on feeding by weight, yet at no extra cost to you.

The thoroughness of the mixing action is another new feature, of great value in making scarce and precious cement go farther. This was proved by tests recently reported by the City of Detroit Testing Laboratory. These tests showed 50% increased strength, with the same amount of cement as used in a conventional batch mixer. This obviously makes it possible to obtain equal strength with more economical mixes.

The Yoder saves in other ways: Only half the first cost of a batch mixer of similar capacity—less than half the wear and maintenance cost. Also, by eliminating expensive weighing batchers and conveying equipment between bins and block machine.



Concrete Machinery Division
THE YODER COMPANY
5551 Walworth Ave. • Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING

CONTINUOUS MIXER

with Vibrating Constant Volume, Non-Clogging Belt Feed

INDUSTRY NEWS

Sales Gain

CONSUMER Co., Chicago, Ill., has reported a 25 percent increase in the sales of building materials in 1950 over 1949 sales. The company sold ready-mixed concrete in the Chicago area for the first time in 1950. Sales reached $11,118,360, as against $8,927,081 in 1949. A controlling interest in the company was purchased recently by the Murchison interest of Dallas, Texas. John D. Murchison and James H. Clark were added to the board of directors to give effect to the Murchison control.

N.R.M.C.A. Safety Contest

NATIONAL READY MIXED Concrete Association is putting on a drive to encourage all active members to participate in the annual Ready Mixed Concrete Safety Contest. The contest covers the 12-month period ending June 30, 1951. Trophies will be awarded to member companies with the best safety records in three classes, the group classification being based on cubic yard output. If there is more than one company in any of these groups with accident-free records, the trophy will be awarded to the company with the largest combined total of cubic yards produced and man-hours worked in that particular group. Member companies with an accident-free record which do not win a trophy will receive a "Certificate of Achievement in Safety." In addition, "Certificates of Accomplishment in Safety" will be awarded to employes of the three trophy-winning companies.

Concrete-Block Carrier

L. M. KENNEDY & SONS, Philadelphia, Penn., has developed a method of delivering concrete block that has almost completely eliminated breakage of block in transit, and enables three more trips per day than by standard truck delivery. The company delivers to any job within a 25-mile radius, using a Gerlinger straddle material carrier.

The lift truck loads cubes of concrete block on a 12-ft. long steel tray. Maximum load is 400 block or eight tiers of 50 block each, weighing 12,000 lb. The carrier is driven directly to the construction job and the unit is able to travel over almost any kind of terrain, maneuvering around lumber and material piles that would prohibit approach by standard trucks. In unloading the block, the carrier operator engages the chain-driver "pusher" bar and the load of block is gently pushed off the steel tray, the load remaining intact and breakage almost non-existent. The method also eliminates loading and unloading crews.

Heat-Resistant Concretes

R. A. HEINDL AND Z. A. POST of the National Bureau of Standards are conducting an extensive investigation on the preparation and properties of castable refractories. N.B.S., in a technical report, has summarized some of the results of this investigation as follows:

Refractory castables usually employ crushed and sized fire-clay brick grog as the aggregate, although other aggregates, such as trap rock, blast furnace slag, topaz, bloated clay, chrome ore and vermiculite have been used in limited quantities. The bonding cement is primarily a calcium aluminate, rather than a combination of calcium silicates as in portland cement. It thus has high early strength and greater resistance to high temperatures. The initial strength is developed because of the setting of the water-cement mixture; but if the castable is used at high temperatures, its ultimate strength will be due to fusion of the cement into a ceramic bond.



Straddle-type carrier used for delivery of concrete block direct to construction jobs

CLINTON CONCRETE PRODUCTS Co., Wilmington, Ohio, held its third annual meeting for distributors April 5, 1951 at Wilmington. The main feature of the program was a talk by R. E. Copeland, director of engineering, National Concrete Masonry Association, Chicago, Ill., who spoke on "Masonry Wall Cracking — Causes and Remedies." Slides were used to illustrate his talk.

HARRY T. CAMPBELL SONS' CORP., Towson, Md., producer of "Sakrete," dry ready-mixed concrete, is sponsoring a TV program, "Sakrete's Family Handyman," which is designed to show how the average family can fix or repair things around the home easier, faster and better, and also, how to save money while doing it.

READY-MIXED CONCRETE Co., Covington, Ky., recently purchased property, measuring 47½ x 190 ft., valued at $10,000, from the Chesapeake & Ohio Railroad. The concrete company plans to move its plant to the new location sometime within the next few months.

TRAIN CONSTRUCTION Co., Lindsborg, Kan., is building a ready-mixed concrete plant at Ellsworth, Kan. The company also operates ready-mixed concrete plants at Lindsborg and McPherson. The first project scheduled for the Ellsworth unit is to supply concrete for a new grade-school building.

CAMDEN READY MIX, INC., Camden, Ohio, owned and operated by J. Elroy Kabler, has been sold to R. E. Ulrich, J. Frank Smith and Dr. Fran Hurst. Mr. Kabler announced that he is forming a new company—The Industrial Co.—which will be temporarily located in West Alexandria, Ohio. He is seeking offices in Eaton, Ohio, for the firm.

SOUTHEASTERN SAND AND GRAVEL Co., Tallassee, Ala., subsidiary of Southeastern Concrete Co., Aiken, S. C., has announced plans to locate a plant near Aiken. The new plant will ship sand by rail and truck, in addition to serving the concrete plant at Aiken.

CENTRAL SAND & GRAVEL Co., Portland, Ore., has sold its concrete batching plant to Weston Readi-Mix, Inc., Portland, Ore. The plant operations will be managed by Eugene M. Daniels, formerly office manager for Central Sand & Gravel Co. The new owners plan to expand operations.

MONTANA READY MIXED Concrete Association held its first annual meeting, March 30-31, 1951, at the Placer Hotel, Helena, Mont., with approximately 60 persons attending. Program activities included a report on the group's national convention; a talk by R. A. Neill, executive secretary of the Montana Taxpayers' Association; talks by A. W. Jones and L. H. Richter, engineers for the State Highway Department. A representative of Ideal Cement Co. discussed problems of supplying cement.

You're not the only one concerned!

We know you're not the only one *concerned* with the truck mixer you're buying. That's why Rex Moto-Mixers are designed to *satisfy all* those who are *concerned* with *your* purchase. For Example:



your operator is concerned...

Your truck mixer operator can be one of your greatest assets—or liabilities. To be a valuable asset he must have a machine that is fast and easy to operate—one that is free from fatiguing vibration—is built with his comfort and safety in mind, keeping him alert and enthusiastic about customer satisfaction.

He wants a machine with simple, easily operated, grouped controls enabling him to mix quality concrete and put it where it is wanted, when it is wanted—a machine that won't dribble concrete all over the job, streets or roads. He wants to satisfy the public and your customer.

He'll satisfy your customers and be a valuable asset when you buy REX.

your mechanic is concerned...



He knows his job depends on keeping machines rolling. He wants to keep your customers satisfied with *complete* on-time deliveries. He wants a machine that requires least maintenance and repair—that's easy to maintain and repair . . . whose parts are readily accessible. Rex Distributors are famous for readily available repair parts.

He'll help satisfy more customers when you buy REX.

Ask your local Rex Distributor to demonstrate Rex profit-making advantages.

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...your customer will benefit!

When you've satisfied all those concerned with the operation of a truck mixer, it's just natural your customer will get better service. He'll have his quality concrete delivered on time, every time. He'll avoid arguments with the inspector and idle crews. He'll save money.

He'll be a satisfied customer when you buy REX.

and, you'll benefit...

You know that keeping your customers satisfied is your most valuable asset in your business success. You want a truck mixer that will give you long years of service . . . one that's low in weight yet with plenty of strength where it's needed. A machine that won't be obsolete in a year or two with spare parts out of date by the introduction of a radically new model. You want a machine that gives you *lowest maintenance cost, least lost operating time, lowest operating cost.* In short, you want the truck mixer that enables you to give your customer the highest quality concrete at the lowest cost and the best possible service.

...WHEN YOU BUY REX



CONSTRUCTION MACHINERY

ANOTHER FIRST



for the Ready-Mixed Concrete Industry

THE FIRST TRUCK and MIXER COMBINATION
developed exclusively for ready-mixed concrete service

Cook Bros. "M-10" Truck is now in production and available with either Challenge 6 or 6½ yard mixer . . . 6½ yard mixer shown above.

COOK BROS. "M-10" TRUCK and CHALLENGE MIXER
Gives You Thousands of Pounds Greater Payload

Cook Bros. Equipment Company, manufacturers of trucks and truck equipment, and Challenge Manufacturing Company, again combine their engineering and manufacturing "know how" and prove their leadership in the ready-mix concrete industry, with the first complete truck and mixer unit.

Experienced operators will immediately recognize the many outstanding advantages of this completely new unit.

The one-man cab with the mixer engine mounted along side, moves the center of gravity forward, thus permitting several thousand pounds more payload weight to be carried on the heavy duty front axle . . . without increasing the wheelbase. This new ready-mix truck is much easier to drive . . . easier to maneuver between and around building forms. It is a unit that will quickly pay for itself with greater operating profit, and one you'll surely want to add to your fleet.

For complete, detailed information and load chart data, write, wire or telephone today!

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Please send complete information on the M-10 together with name of my nearest Challenge dealer.

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One man easily adjusts Cutting Head to desired height... Whether cutting12" or 1" material. Operator's hands merely guide. Weight supported by rear Bar.





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Just turn the Save-A-Blade Dial to the material hardness and the pressure Equalizer Spring automatically sets the tension—guarantees faster cutting and longer blade life.

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Pull the knob—and the Cutting Head is free for finger-tip setting at any desired angle. Release the Knob—and Head is locked in the desired position.



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With the MODEL HD CLIPPER you can choose your cutting method . . . cut DUSTLESS (wet) in confined areas or DRY when DUST is not a problem. Remember too, there are NINE Clipper Models designed to perform with smooth simplicity and flexibility.

NOW! CUT CONCRETE OR ASPHALT..



...BUILDING FLOORS
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with a
CLIPPER CONCRETE SAW
You Save Time and Material when you cut straight, smooth edges . . . then Break Out

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'INCOR' SAVES $15,000

ON FORMS . . . SPEEDS COMPLETION OF MIAMI BEACH HOTEL

HERE'S WHY THEY ASK FOR 'INCOR'



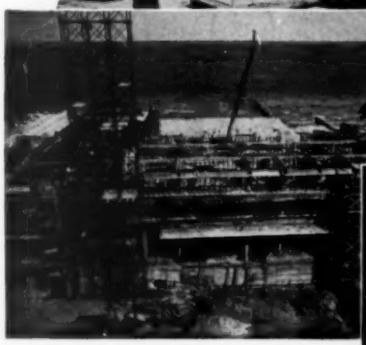
● Of fire-safe, concrete-frame construction, Miami Beach's fine, new Sans Souci Hotel illustrates a principle which will come in handy in expediting defense structures of all kinds.

For earlier occupancy, this well-handled project was concreted throughout with 'INCOR' 24-HOUR CEMENT. Dependable 'Incor' high early strength made it possible to maintain top-speed schedules with a single set of forms—saving two extra sets which would have been needed for equal speed with ordinary portland cement.

Forms cost plenty, these days, and you will find that 'Incor' savings run into real money—on this job, a tidy saving of $15,000.*

Performance like this explains why Ready Mix Operators make 'Incor' concrete available as part of their good service. Users KNOW they can depend on 'Incor', America's FIRST high early strength portland cement.

*Reg. U. S. Pat. Off.





SANS SOUCI HOTEL, Miami Beach

Architect: **ROY F. FRANCE,** Miami Beach

Engineers: **RILEY & ROSS,** Miami

Contractor: **TAYLOR CONSTRUCTION COMPANY,** Miami

'Incor' 24-Hour Cement supplied by: **ALFRED DESTIN COMPANY,** Miami Beach

LONE STAR CEMENT CORPORATION

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 17 MODERN MILLS, 125,000,000 SACKS ANNUAL CAPACITY



LONE STAR CEMENTS COVER THE ENTIRE CONSTRUCTION FIELD

V. Paturzo Bros. and Son, Baltimore, Md., attains flexibility and economy through use of equipment with long experience record in cement industry



The two airslides under the cement bin feed the two batchers; note rotary blowers on platform

Conveying Bulk Cement By Pump

By WALTER B. LENHART

V. Paturzo Bros. & Son, Inc., Baltimore, Md., is one of the largest concrete block manufacturers in the United States. The business was founded in 1923 by the two brothers, Vincent and Anthony, and grew out of a contracting partnership that started 48 years ago. During the past 20 years the affairs of the company have been under the management of Sam Paturzo, who is also a director of the National Concrete Masonry Association, and is well known to the industry. His father, Vincent, still keeps a watchful eye on affairs and the father and son skillfully guide the company.

It has been observed that companies as old as V. Paturzo Bros. & Son are apt to have operations that easily testify to their age because of the run-down appearance of their plants, and often by the use of antiquated equipment. This type of company seems to survive because of some local condition that is not common to the industry.

The Paturzo plants present a picture entirely different from this, for they have a very up-to-the-minute operation and the operators are quick to take advantage of cost-cutting methods. This stems from necessity, for the Baltimore area is a highly competitive one with possibly too many producers all bidding for business. Aside from this stiff competition between concrete masonry manufacturers, the clay brick competition is equally severe. One result is that the unit sale price for concrete block in the Baltimore area is well below the national average.

This competition has resulted in several new developments in the Baltimore area, for here is the birthplace of plastic and tile-faced concrete block that will give the clay tile manufacturer some competition. On the other side of the picture, the clay manufacturers have in this general area come out with a clay tile unit, precision ground on four faces, that will compete with the standard 8's, or concrete masonry units of a similar size.

This type of competition extends throughout the concrete masonry



Vincent Paturzo, president of the company, and one of the founders, is still active



Among the plant superintendents are B. J. Serra, left, general superintendent, and Lawrence Serra, foreman of Plant No. 3



Air view of the Paturzo plant. Numbers identify the following: (1) Plant No. 1 (one block machine) and office; (2) Plant No. 2 (two block machines); (3) Plant No. 3 (two block machines); (4) pump house for bulk cement handling system; (5) valve control station; (6) bulk cement bin for Plant No. 1; (7) bulk cement bin for plant No. 2; and (8) bulk cement bin for Plant No. 3

manufacturing plants in the Baltimore area, so to survive on a healthy and profitable basis, plants have to be efficient. The plants of V. Paturzo Bros. & Son are constructed along modern ideas. The trade name "Pat Block" is used and has earned a good reputation in the Baltimore area.

Plant Layout

When we say plants of this company one might get the impression of a series of operations strategically located about the city of Baltimore. Actually there are three plants all in the same yard. By referring to the aerial view it will be noted that the Pennsylvania main line is one boundary line, the curved switching track acts as the other boundary line; all the land between these lines is owned by the company. The area is in the northeastern section of Baltimore, an industrial area of considerable magnitude and advantageously situated for truck shipments of the finished products. The three plants contain a total of five Besser Vibrapacs and these are operated ten hr. per day without stops during the noon hour.

One might ask why three plants are all in the same yard. As Mr. Paturzo pointed out, there are certain advantages to this type of plant layout. Where four or five high-capacity machines are all squeezed under one roof, the problem of intraplant transportation becomes one of major proportion. Under such a set-up a large fleet of lift trucks can be in a permanent traffic snarl. This can slow down production as well as increase the chances of serious accidents to employes, supervisors, or visitors. Diversification as to the nature of the plant's output can be more easily accomplished under the pattern set by the Paturzo operation, as well as other more obvious advantages.

Under the set-up all aggregates are delivered to the plant by trucks. Sand, gravel, cinders, and expanded slag or foam slag are all purchased. Also, all of the plants' output is shipped by trucks under contract. The contractors assign some 40 trucks of various sizes to this work. At each plant, bins are available to facilitate truck unloadings.

Cement Handling

Portland cement is delivered to the plant in closed hoppers. The problem is to distribute the bulk portland cement efficiently to the three separate plants, and once the cement is at a given plant to get it to the batching hoppers ahead of each block machine.

To accomplish the former, Sam Paturzo installed a substantial track hopper of concrete and steel. Under this track hopper, and in a room of adequate size, a 6-in. Fuller-Kinyon cement pump has been installed. This is a permanently mounted F-K pump and is probably one of a very few similar installations of its type, in concrete block plants, in the world. Air is supplied this unit by a F-K rotary compressor. The installation is almost exactly similar to many in portland cement manufacturing plants.

The bulk cement discharges from the Fuller-Kinyon pump through a 5-in. underground steel line to a valve house nearby. At the valve house the flow of portland cement can be directed to any one of the three plants. The pipe lines, for the most part, are all underground, the exceptions being where the 5-in. pipe goes up and into each rectangular steel bin at each plant. The horizontal distance pumped is roughly 400 ft. maximum, with a maximum vertical lift of 40 ft. The three bins for Plants No. 1, 2 and 3 hold 400, 600 and 400 bbl. of cement, respectively, making a total storage capacity of 1400 bbl., plus track storage of two or more closed hoppers.

No. 1 plant is alongside the company's main office and is the oldest operation. This plant is the conventional bins-over-batcher type and has one Besser Vibrapac. The other two plants are newer, each has two Bessers mounted side-by-side and both use belt conveyors for the aggregates throughout. Each block machine has its own batcher and skip. Also, each plant has its own curing facilities.

In such a plant design, it becomes obvious that the area covered



Office and Plant No. 1; cement bin with venting stack can be seen behind and above sign

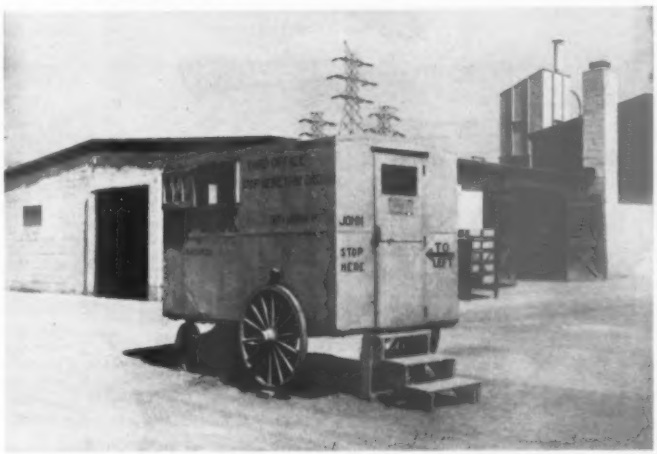
by the three plants is quite considerable, so the problem of getting bulk cement to each individual batcher would be acute were it not for the adaptation of another modern method of transporting bulk cement, namely by use of airslides. This is the first installation of airslides of any consequence in any concrete block manufacturing plant in the world.

Airslides

ROCK PRODUCTS has published several articles on the use of airslides in portland cement, hydrated lime and other plants, but in CONCRETE PRODUCTS no extensive data have been published, so a brief description of the unit is admissible. The airslide is also a product of the Fuller Co.

The airslide conveyor consists of a steel box of 10 to 12 gauge sheet metal roughly 8-in. square in cross section. For its entire length it is divided horizontally into two compartments, the division being along the horizontal plane. This flat, horizontal dividing wall is made up of a porous media which somewhat resembles a piece of cotton transmission belting. If dry portland cement is introduced into the top half of this steel box, and low pressure air introduced into the lower half, the air goes up through the porous membrane and becomes mixed with the portland cement, fluidizing it. The result: the portland cement flows like water down to its destination. Air is introduced at 3 to 5 lb. pressure from either a fan-type blower or a low pressure rotary blower. The amount of air used is so small that the operation is practically dustless. At the Paturzo operations 2- and 3-hp. motors operate the Connelsville rotary blowers. The 3-hp. motors are on the longer airslides. One blower is used for each airslide.

Essentially the five airslides in use at the Paturzo operations are identical, so only the installation at plant No. 2 will be described. The Fuller-Kinyon pump delivers cement to the



Portable yard office for the yard foreman to check out all truck deliveries

600-bbl. bin. A vertical pipe roughly 10 in. in diameter is on top of this bin. It acts to vent air that is the fluidizing agent in the F-K system. The pipe is covered with a hood to keep out rain.

Under the bin are rotary valves that feed the two parallel operating airslides, one airslide for each batcher. In the throat of the rotary valve assembly is a clean-out hole covered with a plate during normal operation. The purpose of this clean-out hole is to remove any coarse foreign material that might be in the cement. The airslides have been in operation about one year and so far the only trouble has been due to coarse fragments of set portland cement that come from the vent pipe. During damp weather the vent pipe tended to accumulate small incrustations from moisture, plus small amounts of cement dust adhering to the interior walls of the vent pipe. Earlier, it was the practice to pound on this vent pipe every week or ten days, which was too long a period and allowed accumulations to develop. These crusts fell into the bin and into the portland cement and eventually caused trouble with the airslides. By cleaning the vent every other day no further trouble has been experienced and the units operate smoothly and efficiently.

On this bin, each airslide delivers to a weigh batcher ahead of the block machines. At the out-board or discharge end of each airslide is an air-operated gate that is interlocked with the airslide assembly. In use, the assembly functions as follows: when the operator of the batcher desires cement, he presses a button. All gates open, air is introduced into the airslide and cement flows into the scale weigh hopper.

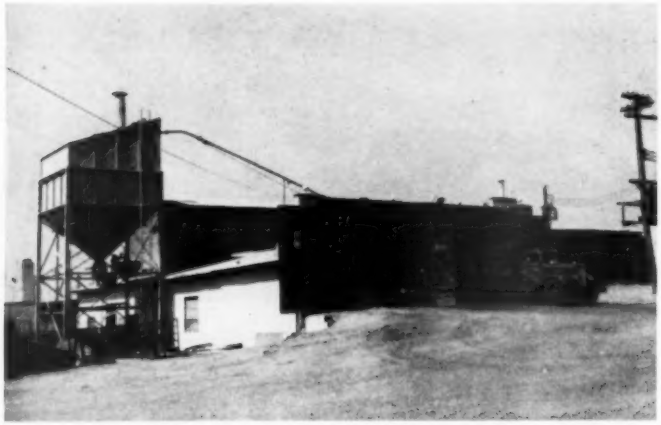
When the preset amount of cement is in the hopper an electronic control functions which automatically closes



Crimping machine for reclaiming pallets with worn edges, shown in operation at the Paturzo plant



Stack of crimped pallets. Two top pallets are new and of standard thickness. The rest are so worn that the edges are very sharp



Truck is dumping aggregate into enclosed bin; the pipe going to the bin at left carries cement from the cement pump. Each of the other two plants is similar in arrangement

all gates, and at the same time the air from the blower to the airslide is automatically vented to the outside. The blower at each bank of slides operates continuously and air is used in the airslide only when the operator wants cement. One button controls this entire operation. It is located near the batcher for convenience of the operator. Cement weights are preset by the supervisory staff. If there are errors in the quantity of cement, the error is due to management and not to the operator or to mechanical functions.

The air gate at the discharge end of the airslide is intended to prevent any dribble of cement once the weigh hopper's requirements have been met, but in practice it was found that this actually was not needed, for when the air to the slide was cut off the cement stopped flowing almost instantly. However, the end gates are kept in service as insurance. The devices, including the weigh batcher, have an accuracy of one percent (plus or minus) per batch.

Batching

The aggregates at the Paturzo operation are batched on a volumetric basis as experience has shown this is more accurate than weigh batching. It is the company's contention that the yield of block per bag of cement is more a function of volume than of weight, and consequently the amount of portland cement used (or required) is more a volume than weight function. Hence by the use of volumetric batchers greater uniformity in block strengths is possible, especially if the aggregate contains variable amounts of moisture, or more importantly, variables in specific gravity weights.

The batchers at the Paturzo plant are five in number, all alike, and were designed and built by the company. The interesting feature of these batchers is the use of one compartment for batching a dual mix of aggregates—it is to be recalled the cement is weigh batched separately.

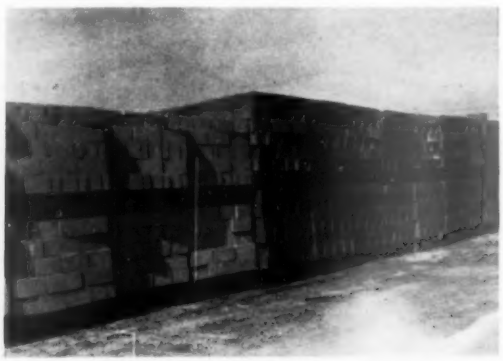
The design of the concrete mix used at the Paturzo operation is based on the use of two aggregates, one considered to be the main aggregate and the other a blending or auxiliary aggregate. However, a one aggregate mix can be used if desired. Three main types of block are made. Sand and gravel for the first type of block are delivered to the proper bins as a previously mixed aggregate prepared by the seller. To this type of block some exanded slag (minus ¼ in.) is the blending or auxiliary aggregate. The second type of block is the cinder block, and with it some foam slag is the auxiliary aggregate. The third type of block is for exposed masonry work and is trade-marked and sold under the name of "PATTEX." It is a foam slag block with limestone screenings as the auxiliary aggregate. This block has a fine texture and is quite pleasing to the eye.

In making any of the three general types of block, the sequence of operation is essentially the same. The aggregates are stored in bins that can be filled by trucks dumping directly into them. All conveyors have 24-in. belts for standardization and use Continental and Robins idlers. The belts all operate on a pitch of 24 to 26 deg. from horizontal and at slow speeds. As the aggregates are all relatively small, no trouble with roll-back is experienced. The feed to all belts is by simple chute gate, gravity feed type. The bins hold 40-50 cu. yd. each. There are usually two bins per machine, each bin served by its 24-in. inclined belt, and both deliver to the same batcher. All conveyors are driven by Master gearhead motors with brakes on the motor, another step towards standardization. Both Goodyear and Quaker belts are used.

Volumetric batching is accomplished as follows: the operator presses a



Covered hopper car over the cement truck hopper. Cement pump is below the rail line; rotary compressor is in building at right



Here can be seen two methods of cubing and stocking with lift trucks the company uses

button and the belt conveyor feeding the main aggregate starts to fill the volumetric hopper. In this hopper there is a small float or finger that operates somewhat on the principle of the float valve in a flush toilet. When enough of the main aggregate is in the hopper, this finger functions to open the circuit on the belt conveyor, thereby stopping it. At the same time the circuit is closed on the second belt conveyor and it immediately starts to deliver the auxiliary or blending aggregate. When the second aggregate is in the weigh batcher another finger or float functions to stop the second conveyor. The device is very simple, functions perfectly, and can be preset to deliver any volumetric proportion desired, within the limits of the batching hopper capacity. It was designed and built by the company. Thus the batchman has only two starting buttons, one for the cement and the other for the aggregate or aggregates. The batchers unload to 40-cu. ft. Besser mixers which in turn serve the block machines by means of skips.

The sequence, then, is (1), one or both aggregates introduced into volumetric batchers and then to mixer (2), water added by a water meter and (3), cement introduced.

There is one operator and one pallet man at each block machine. These two men alternate, one usually running the block machine in the morning and the other in the afternoon. All machines are equipped with offbearers that are pneumatic. The block machines do not stop during the lunch hour. There are usually 4 to 6 extra men in the plant area and a system has been worked out whereby these men come into the plant and help keep it running continuously. The lunch period is from 11 a.m. to 1 p.m.

Curing

Curing of the block is accomplished by means of heated air augmented by steam unit heaters. No live steam is used. Each of the three plants has its own curing room which is of sufficient size to hold the day's production. For instance, Plant No. 2 has room for roughly 20,000 standard 8's. In this room are several unit heaters. Also, near the center of the area is a Thermo Block air heater. This is an oil-fired unit made by Prat-Daniel Corp., East Port Chester, Conn. The combination of heating units raises the temperature of the block to 110-150 deg. F.; the only moisture in the room is that in the block. The officers of the company after years of work on curing find this to be the best and most economical method of curing so far devised for their product. Block cured by this method easily meet all local and state specifications.

After curing overnight the block are taken from the kiln to the cubing yard where they are cubed into 4-ft. cubes maximum. The cubed block are stored in the yard but never over 16 courses high (15 courses preferred). This height is based on convenience of loading for shipment in trucks. All units are hand loaded.

Yarding-Handling

For handling the cubed block four Towmotors, Type LT60, are available. Three are in use and one is held for emergency use. For transportation of loaded racks to and from the kilns, and to return racks to the machines, seven Automatic Transportation "Transporters" are available along with three Erickson trucks. The Transporters are relatively small units powered by heavy-duty Exide batteries. The operator does not ride this type of truck. A Trojan scoop lift truck is available for any aggregates that might be ground stored in the yard.

The steel pallets are returned from the cubing yard to the machines with only a superficial cleaning, if any. They are not oiled. Steel pallets on which edges are worn too thin to feed properly into the block machines have the edges crimped with a Geist crimper. The practice is to crimp or corrugate the edge of worn pallets in four places, two on each of the long edges. The corrugations are about 5-in. long and are so located on the pallet that this corrugated or raised edge will contact the two lugs on the pallet feed chain. The corrugations extend back towards the center line of the pallet about one inch. By its use a much longer life can be obtained from the pallet.

All shipments before leaving the yard are checked by the yard foreman who punches the shipping tickets. It is an unbreakable rule not to pay the contract hauler unless the ticket is punched. The yard foreman has a portable office which can be wheeled and spotted at strategic places in the yard. The yard contains in excess of a million units at all times. The plant has a nominal capacity of 50,000 units per day on an 8-in. equivalent basis. Traffic within the yard is becoming a problem, so changes are being made that will facilitate truck movements within the yard.

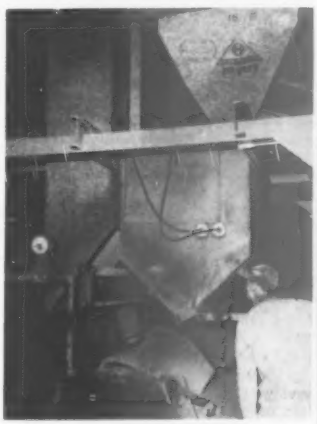
Sales are through dealers and direct to users. The ratio is about 50-50. One salesman is employed.

Personnel

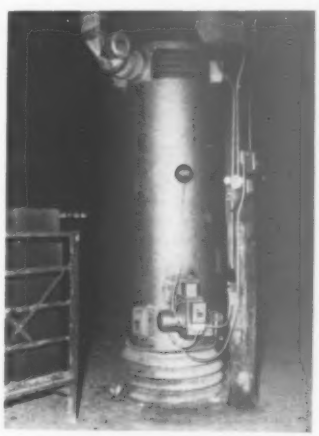
Vincent Paturzo is president and Sam Paturzo is vice-president. Other officers are B. J. Serra, general superintendent; Frank Walton, assistant superintendent and foreman of No. 1 plant; James Baker, foreman plant No. 2; Lawrence Serra, foreman plant No. 3; and John Ruth, yard foreman. Alfred C. Meyers is office manager, and Harry C. Rivers, Jr. is shipping manager.



The two belts deliver expanded slag to two different batching hoppers



At right is the volumetric batcher. The two wire lead-ins on the side of the bin go to the float finger that controls volume batched



Units for supplying heated air to block curing rooms; it is oil-fired



Conveyor Handling of Silo Staves

THE C & B SILO SALES CO. of Grand Rapids, Mich., manufactures concrete staves for the more than 200 silos it constructs annually. Using hand methods to rack, pile, and load, the 5000-stave weekly output once was a slow, tiring process for the production crew. In order to reduce employe fatigue, this firm installed a portable power belt conveyor in July of 1950 to do the heavy lifting and carrying jobs.

Formerly, staves were racked as they were removed from the kilns, and then taken to stacking areas in the yard by a lift truck. Here the 70-lb. staves were piled in three-high tiers, weight and bulkiness making higher stacking impracticable. When loading trucks, the men had to remove the staves from the piles, walk to the truck, and hoist the units 5 ft. to the stacker.

This method had several serious disadvantages. Removing the men from production lines to do heavy lifting and carrying reduced efficiency in both the yard and the plant, and had a bad effect on employe morale. Stacking the staves only three tiers high did not provide enough room in the yard for necessary stockpiling during the winter months. Also, it was almost impossible to keep an accurate count of materials being loaded on trucks. Any shortages would not be found until a silo was nearly finished, perhaps hundreds of miles away. Construction was then held up until more staves could be rushed from the factory.

A "Stevedore, Jr." power belt conveyor is now used to lighten the work of handling. Staves are removed from racks and placed on the belt of the power unit which stacks the material to a height of six tiers. This feature has doubled the capacity of the yard, allowing staves to be stockpiled until needed. The power unit also boosts the staves from storage piles to truck loader, making the work immeasurably easier.

An interesting feature of the C & B installation is the method used to eliminate the delay and expense of short-count loads. As each stave travels up the belt it trips a counter, giving the operator a positive check on the amount loaded. This accuracy was impossible when the staves were loaded manually.

The "Stevedore, Jr." is also used to move bagged cement into the warehouse and to handle lumber used in making silo doors. This unit is easily moved to any part of the warehouse or yard to speed up and lighten work of handling.

Concrete Masonry for Military Construction

NATIONAL CONCRETE MASONRY Association, in one of its recent reports, stated that concrete masonry may be utilized extensively in the contemplated military construction the Department of the Army will undertake this year. The design, supervision of construction and other engineering aspects will be handled by the Corps of Engineers. Pending the final decision to utilize concrete masonry in this work, the Office of the Chief of Engineers has requested the assistance of N.C.M.A. in developing construction details and specifications. Definite recommendations to minimize cracking in concrete masonry walls was especially requested. Accordingly, after a careful review of the matter by the N.C.M.A. office, together with the Technical Problems Committee and Board of Directors, N.C.M.A. has submitted specific recommendations and suggestions to the Office of the Chief of Engineers. These, together with recommendations from the National Bureau of Standards and other technical organizations, were studied by the engineers in the light of their own information and experience. As a result of these joint endeavors, the Office of the Chief of Engineers has issued certain information, under the title, "Design and Construction Procedures for Permanent Construction, Utilizing Concrete Masonry Units," for the guidance of the Corps of Engineers' field offices.

Among some of the topics covered in this guide are: designs for longitudinal reinforcement in exterior walls of wall-bearing construction and nonbearing enclosing walls, in exterior filler walls in framed construction, and for interior partitions and walls; control joints for exterior walls, interior walls and partitions; openings; specifications for mortar joints and concrete masonry units; sampling and testing of concrete masonry units before acceptance; requirements for protecting finished units from weather and soil; and painting requirements.

Prestressed Concrete-Steel Pipe

PRICE BROTHERS CO., Dayton, Ohio, recently published a booklet describing the manufacture of prestressed concrete steel-cylinder pipe. The booklet proclaims that this pipe is the engineer's solution to the need for long-life, high-pressure water supply lines. The pipe is prestressed by wrapping high tensile steel wire around the steel cylinder and concrete core. The wire is wound under tension and induces a compressive stress in both the steel cylinder and the concrete core. As water pressure inside the pipe increases, this compressive stress is decreased; thus, the steel cylinder and concrete core go into tension only after their compressive stress is entirely relieved. Because of this design, the concrete core, the steel cylinder and the wire wrapping become an elastic structure, in spite of their different characteristics.

The booklet also lists all the steps in the manufacturing process of the pipe, describes the flexible, watertight expansion joint, and lists the advantages of the pipe. Copies of the booklet may be secured by writing to Price Brothers Co., 1932 East Monument Ave., Dayton, Ohio.



Plant of Northern Concrete Products Co. At right a truck is dumping aggregate into hopper over 50-ft. belt conveyor to plant bins



Marvin Feather, general manager of the company and one of two partners in the operation

INTEGRATED CONCRETE BLOCK PLANT

WHAT WAS AT ONE time a township gravel pit is now the site of operations of Northern Concrete Products Co., Petosky, Mich. But the original pit, with barely enough room on its floor for the block plant, has been enlarged so that now there is storage space for the equivalent of 100,000 modular 8-in. block around the concrete block building that houses the plant. The pit has been enlarged not only through use of the sand and gravel in block production, but also through sale of the material to local contractors and a ready-mixed concrete plant.

Sand, gravel or cinders are trucked to the plant and dumped into a hopper of 4-cu. yd. capacity, which feeds material onto an 18-in. belt conveyor on 50-ft. centers for elevation to overhead plant bins. Total storage capacity in this two-section bin is 70 tons. Materials from the bin are dumped to a 1-cu. yd. Stearns batch mixer, directly beneath, via clamshell gates. Bagged air-entraining cement is added at the mixer. Concrete is elevated from the mixer at floor level to a 1-cu. yd. hopper over the block machine by a concrete conveyor belt.

Eight 8-in. equivalent block per minute are produced by the company's Lith-I-Block block machine that is operated in conjunction with a two-pallet pneumatic offbearer. A Truck-Man gasoline-powered lift-truck is used to transport loaded six-high block racks to a curing area.

This plant, being located near the northern top of Lower Michigan, must produce its annual quota of block during summer months, as the winter temperatures in this area are too severe for concrete or sand and gravel production. Curing cycle at this plant consists of several days of sprinklered storage. Crushing strengths adequate to meet all state and architectural specifications are met by this method. Eight-in. sand and gravel block test at 2400 p.s.i. at 30 days. A rule of the company is that no block leave the plant until they are cured at least 30 days in the stockpiles.

Production is seasonal, as is demand in the Petosky area, and there is no major building during cold winter months. All modular sizes of block are produced by Northern Concrete Products Co., plus chimney, bull-nose, corner, and other special block. Concrete brick are also produced on the Lith-I-Block machine. Concrete products are distributed in a 40-mile radius of the plant.

Pit-run sand and gravel is brought to the processing plant by two methods, depending on type desired, i.e., one side of the deposit contains much more fines than the opposite side. A ½-cu. yd. dragline delivers pit-run material to a hopper at the plant, and the alternate method for material recovery is by loading to 5-cu. yd. dump trucks with a Barber-Greene bucket loader for transportation to the gravel plant feed hopper. A Traxcavator end-loader, mounted on a track-type tractor aids the bucket loader in special material recovery at various parts of the opened pit.

The all-steel sand and gravel plant, using belt conveyors for intraplant material movement, incorporates a vibrating screen and jaw crusher as processing equipment. The screen, a 3-deck Simplicity, carries 1-in. mesh on the top deck, ½- and 3/16-in. mesh on the other two decks, respectively. Crusher at this plant is an Austin-Western jaw, with a ¾-in. setting. Discharge is returned to the screen in a closed circuit. Finished material falls to truck hoppers under the screen of 35-cu. yd. total capacity. Cinders used for lightweight block production are passed through the same plant for proper grading.

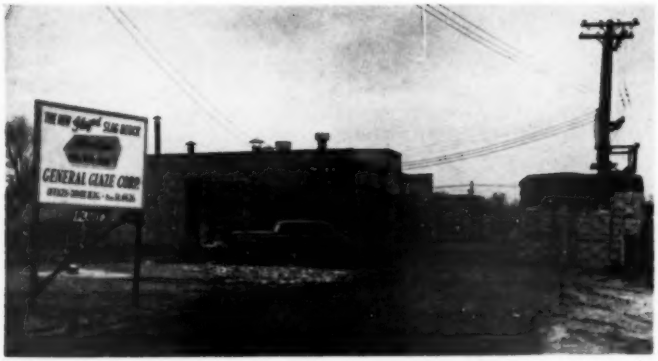
Northern Concrete Products Co. is a partnership operated by Marvin and Norman Feather.



Operator removing two pallets with pneumatic offbearer



One cu. yd. mixer is in background, and block machine can be seen at right



View of plant of General Glaze Corp., Baltimore, Md.

Load-bearing concrete units faced by mass-production methods to give tile and textural effects in variety of colors

Adding Beauty to Concrete Masonry Construction

GENERAL GLAZE CORP. recently placed in operation at Baltimore, Maryland a new plant to manufacture a new type of concrete masonry product. The new process, developed and licensed by The Burns & Russell Co. of Baltimore, consists of applying a smooth, fine grained, colored glazed face to a concrete block. The glazing operation involves the use of a controlled heat treatment; the glazed facing uses no portland cement products.

Tile Facing

At the time of inspection, the plant was turning out approximately 3500 tile-faced units in 8 hr. Under this process, the glazing is bonded to the block under conditions that make the face become almost an integral part of the unit. In essence, the facing material is applied to the face of the block, after which the unit is baked in a tunnel-type oil-fired oven, resulting in a finished structural unit that is competing with clay ceramic tile over a wide area.

The new plant of the General Glaze Corp. adjoins the yard of the Marietta Concrete Corp. on Pulaski Highway & Race Road, a few miles east of Baltimore. General Glaze uses block produced by Marietta Concrete. Lightweight slag is the aggregate used in this case but, according to Burns & Russell, any high quality lightweight aggregate might be used.

The products made by General Glaze Corp. are marketed under the trade name Spectra-Glaze (trademark property of The Burns & Russell Co.). The work is the result of pioneering in the low temperature glazing field by The Burns & Russell Co. and uses their Cermac glazing compounds. In the design and erection of the General Glaze plant, Burns & Russell was active in the coordination of the chemical engineering of the glazing machinery and equipment, and their personnel supervised the initial stages of production.

Types of Block

There are two broad types of Spectra-Glaze block. One is the so-called "Textural Unit" and the other the "Tile-Face Unit." The textural glaze is a thin film glaze which retains the natural texture of the base block and reduces the sound absorption properties of the block by less than 1 percent. The tile-face glaze completely fills the voids in the face and presents a uniformly smooth surface. Various shapes, such as bullnose, cove base and sill block are part of the line which General Glaze is offering.

For several years a glazed concrete block, the textural unit, has been developed. A commercial plant using the Spectra-Glaze process for making textural block went into operation in the south about two years ago. The tile-face unit is a newer development and this is the first description of this new process to appear in CONCRETE PRODUCTS.

The textural unit is made by spraying block with glazing compounds under controlled conditions, resulting in a stain-proof, color-fast finish that is tough and quite ductile. Color selections are wide.

The cubed block are delivered to the



Finished block being removed from curing furnace

plant by a Towmotor fork lift truck. As surface dry block are more desirable, a considerable portion of the floor area in the new plant is devoted to storage space where block, previously stacked in the yard, can remain dry.

Manufacturing Steps

Textural face. Concrete block are placed on an endless conveyor and slowly carried through a preheating section. When the heated block leave this preheater they continue on into an enclosed spraying chamber where the glazing compounds are sprayed on. All vapors from the spraying operation are drawn away by an exhaust fan. After receiving the colored glazing compound, the block are heat treated in a continuous furnace or oven. This results in a permanent union between the facing compound and the concrete block.

Tile face. The newer type block, the tile-face unit, uses the same conveyor system referred to above. Shallow die stamped molds are placed end to end on the conveyor system. For a standard 8 in. modular block, the molds are slightly larger than the face to receive treatment and are 7¾ - x 15¾-in. in size.

Glazing the Block

On the conveyor system, the glazing compound is automatically loaded into the molds, after which the block and compound are transferred to the oven. The glazing compound runs up into the pores of the block, penetrating as much as ¼ in., making the face almost an integral part of the block itself. The unit is then baked continuously in the oven used for the textural unit.

The oven is 75 ft. long and about 8 ft. wide. The block move through it continuously and at a rate that assures at least 3500 tile-face units every 8 hr. Production is based on at least 10 percent of the total being special shapes such as corner block. The same oven is used for the baking of the sprayed textural unit and will handle 5000 standard 8's of the sprayed units per 8 hr. day.

When the block and mold have passed through the baking oven, workmen easily remove the mold from the block, after which the mold is put back in the assembly line. All block are packed in a three-sided cardboard container to protect the face of the glazed unit. All finished block are stored in the yard in the open.

Strength of Facing

Recent investigation by a Baltimore testing laboratory has proved that the glazed face on the tile-face unit becomes an integral part of the block. In compression loading tests, the loads were run to the ultimate breaking point of the block and in no case did cracks appear in the facing until the block broke nor was there any other evidence to indicate that the facing had parted from the body of the block itself.

The use of die stamped molds assures exact and identical dimensions for all glazed faces, and the 7¾ x 15¾ in. face dimension automatically exposes only a ¼ in. joint, although the standard head and bed joint is used behind the facing. The dimension tolerances of the block itself are held to a minimum. Marietta Concrete Corp. is delivering block to the glazing plant which vary only plus or minus 1/16 in. in any dimension.

Variety of Colors

Both the textural and tile-face units can be manufactured in practically any color, but General Glaze Corp. carries in stock aqua green, light green, and natural tan. Other favored colors are red, beige, dark green, rose and blue. Although the company recommends both the textural and tile-face units for interior use only, the tile-face unit has been used for exterior work and so far is performing satisfactorily.

The cost of these block is relatively high, but the in-the-wall cost on jobs erected show that Spectra-Glaze units can result in savings of from 20 to 35 percent. General Glaze is currently supplying Spectra-Glaze on jobs as far away as New York City, and has dealer outlets in Washington, D. C., Philadelphia, Trenton, and in other cities within a 200-mile radius of Baltimore.

The sale of Spectra-Glaze units has been very satisfying to General Glaze Corp. to date. In general, the excellent acoustical properties of the textural glaze have directed its use into areas requiring acoustical correction. The tile-face unit has been specified mainly in areas where a permanent and sanitary finish is desired. Jobs to date include a college library building, several schools, hospitals' office buildings, and many other varied uses and locations.



Masonry saw used to cut faced concrete masonry units



Drying oven using infrared heating units

Personnel

The officers of General Glaze are Allen W. Morton, president; William M. Legg, vice-president; and W. D. Finlay, Jr., plant manager.

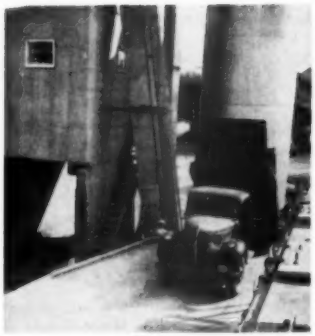
The Spectra-Glaze process is owned and licensed by The Burns & Russell Co. Officers of this company are Alexander H. Russell, president; J. Glenn Whitman, vice-president; and Leo J. Rosendale, treasurer.



Finished tile-faced concrete units being stockpiled by fork lift truck. Note cardboard covers used to protect facing



Here is seen one of the new series chassis mounting a 4½-cu. yd. drum-type transit mix body



Aggregate being dumped into truck hopper. In the immediate foreground at right is bulk cement rail car

McHenry Sand and Gravel Co. advertises intensively to create farm markets and construction outlets for ready-mixed concrete

MERCHANDISING TO SMALL COMMUNITIES

SINCE THE INVASION of Chicago by ready-mixed concrete operations two years ago, this form of concrete delivery is becoming increasingly accepted, not only in the city but also in its environs. A case in point is the McHenry Sand & Gravel Co., McHenry, Ill., which commenced operation of its ready-mixed concrete batching plant a little over a year ago. Although this community is approximately 45 miles northwest of Chicago and is situated in a typical northern Illinois farming area, the influence and lead taken by Chicago is felt strongly. The same is true on all sides of the city, and new plants, both central-mix or batch-type, now number a score or more in the Cook county area.

Merchandising

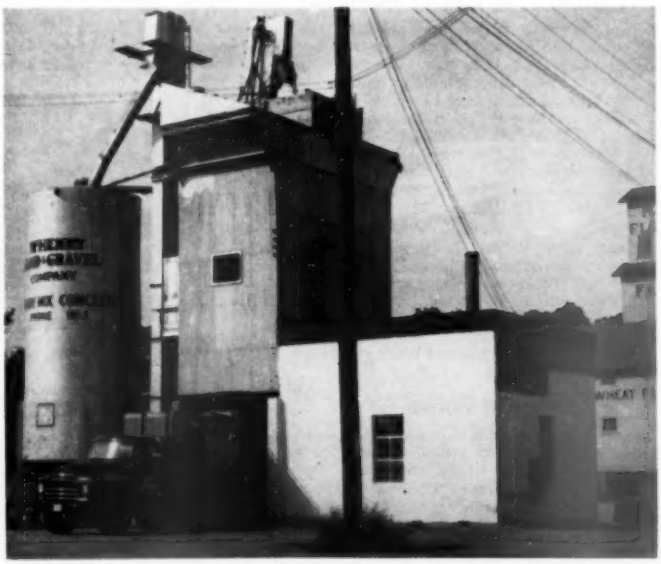
Merchandising practices of this company are of interest when one realizes the type of trade to which it caters. Principal leads for ready-mixed concrete pours come about through the efforts of a full-time salesman and engineer employed by the company. This man, with a station wagon at his disposal, is familiar with and regularly contacts all important contractors in a 25-mile radius of the plant. The pours made for contractors on new construction projects account for over half of the company's total sales.

But the remainder of pours, including feeding floors, barn and house foundations, garages and driveways, amounts to a sizable tonnage in the aggregate. This phase of the business is stimulated by means of the local advertising campaign carried out by the McHenry Sand & Gravel Co. Advertisements appear regularly in the local weekly newspaper which covers six to eight farm marketing centers in surrounding areas as well as farms in the same district. These ads carry such slogans as "Barnyard Pavements are Sanitary, Economical, Labor Saving, Feed Saving, and Last a Lifetime with Ready-Mixed Concrete." Such an ad will carry an illustration of a ready-mixed concrete delivery truck making a typical barnyard pavement pour. Another ad will carry the slogan in large letters: "Buy Concrete for Farm Construction Delivered Ready-Mixed." Copy in this ad reads: "Our ready-mixed concrete is uniformally dense, enduring and strong. The 'mix' is made for your job. Even a small job gets the benefit of large volume production in our efficient central plant."

Additional advertising takes the form of display ads in the six local phone directories which blanket the rural community served by the company. A small amount of direct mail advertising is also carried out.

Plant

The plant, a Butler Bin Co. installation, has no need for large



Right hand bucket elevator at the top is for aggregate and the one at left is for bulk cement with an overflow chute to ground storage tank

sand and aggregate storage facilities as the company's sand and gravel pit is only two miles distant. Aggregates are hauled to the plant by truck. These back up a short ramp and dump to an 8-cu. yd. truck hopper adjacent to the plant. Material from this hopper is fed to the boot of a 60-ft. high bucket elevator by a pan feeder. At the discharge point of this elevator is a swing spout with cable controls for positioning from ground level. There are two overhead bins in the plant, one of 25-cu. yd. capacity for sand and the other of 40-cu. yd. capacity for gravel.

Bulk Cement Facilities

Bulk cement is delivered in rail cars to a siding at one side and immediately adjacent to the plant. From the rail hopper standard portland cement is delivered via screw conveyor to the boot of a bucket elevator on 60-ft. centers. The flop-gate is so adjusted that when the overhead bin is full, the bulk cement automatically runs into the ground storage tank. Combined storage available at this plant is in excess of 800 bbl.

A vertical, oil-fired, high-pressure boiler with full automatic controls develops steam for aggregate thawing. As the truck hopper, pan feeder and elevator boot are in the open, a steam line has been brought to this uncovered machinery for freeing this transfer point of ice during cold winter operations.

Five drum-type transit-mix bodies are used by this plant for concrete delivery. Latest additions to the fleet are three 4½-cu. yd. Rex mixers mounted on L-170 International chasses. Remaining two units are 3-cu. yd. Smith mixers mounted on DR-60 International chasses.

Officers of McHenry Sand & Gravel Co. are Charles J. Miller, president; Eugene Miller, vice-president; Jerome Miller, treasurer; and Dorothy Miller, secretary. Bob Stevens is the truck dispatcher.

Triples Production

CONCRETE PRODUCTS Co., Charleston, S. C., recently completed plant installations which were designed to triple plant output. Open house was held April 3, when the public was invited to inspect the plant. Part of the newly installed equipment will produce a new and improved building block, called "Dura-Blox," which will be available in both cinder and concrete.

Opening of the new plant climaxes a program of expansion instituted shortly after the end of World War II. In March, 1946, the company opened a general sales office and distribution warehouse. In 1948, the company acquired the building material business.

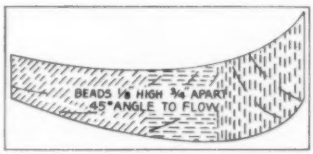
Officers of the company include George P. De Saussure, president; Fred W. Stevenson, vice-president and production manager; and Dan R. Stevenson, treasurer and sales manager.

HARD FACING MIXER BLADES

By L. J. JOHNSON*

A MANUFACTURER of ready-mixed concrete has equipment involving a central-mix plant and delivery by trucks with agitator and dump bodies. The central plant revolving drum mixer is of 2-cu. yd. capacity, 88 in. diameter and 78 in. long and has two sets of agitating blades, seven to each set, bolted with L-shaped brackets to the inside periphery of drum. One set consists of short, straight blades of ⅜ in. plate x 27 in. long x 7 in. wide and performs an agitating or mixing function only. The other set is also of ⅜-in. stock, 64 in. long when projected flat and of varying width, averaging 19 in. This set is bent into a crescent or bucket shape and performs an agitating and elevating function, lifting the concrete to the top of the drum where it is spilled down upon an inserted inclined chute when ready to be removed.

These mixer blades must withstand a severe abrasive action from the sliding concrete ingredients so anything less than hard alloy steel is not economical to install.



Beads in this blade are ¾ in apart. There is good scouring action and slight plate wear. Total cost of this blade including blade, welding labor and welding material amounts to $29

During the past two years the mixer manufacturer has been unable to furnish these manganese steel blades for replacement and substitute carbon steel plate was used as an alternative. The writer projected the shape of the old blade upon ⅜-in. carbon steel plate and flamed cut to size. He then bent to desired shape, making a blade that would function satisfactorily but with no abrasive resistance. Now began the task of manganese facing by arc welding. Each blade has a one side surface area of 8 sq. ft. and he soon learned it would be a tedious and expensive procedure to lay a wearing surface over all of one side, so he began to experiment to learn how to do it more economically. He analyzed the mixer action thus:

(1) Noted sections of blade that appeared to receive most wear.
(2) Direction of flow of material over blade . . . was it transverse, parallel or diagonal to it?
(3) Speed of flow of material over various sections of blade.

From this analysis he concluded that a solid, hardened surface was not necessary to provide protection. It seemed probable that manganese beads laid from ½ in. to 1 in. apart, transverse to the flow of the material, would provide the desired result, being close enough together so that abrasive action would bridge the softer carbon steel body plate and the hardened bead or ridge absorbing all the wear. Not being certain of these conclusions he used different designs on all the seven blades, hoping to learn the most practical application. He used a 5/32 in. Lincoln No. 100 Hardweld rod with an a-c welder. The No. 100 Hardweld was decided upon because of low first cost and ease and speed of application. If the results showed any promise of being of value a true manganese rod would be considered later on future work, when the evidence was beyond the experimental stage.

In summarizing the results, the factors of total cost, durability or life, and degree of scouring and material build-up on blades must be balanced against each other and given proper value. When we consider that the manufacturer's manganese blade costs $64 and has a life of 12,000 cu. yd. of mixed concrete, all the test blades compared favorably. All factors considered, the design of blade in the figure gives the most satisfactory results. The evidence is so gratifying that henceforth we will prepare our own blades and use this design, with only slight modification as future experience may indicate.

*Construction engineer and sales manager, Limestone Products Co., Menominee, Mich.

Concrete Block Plant

KATTERJOHN CONCRETE PRODUCTS, INC., Paducah, Ky., recently announced plans to build a $350,000 plant for the production of concrete block at Paducah. The new plant will have a capacity of 30,000 block per 8-hr. shift. A 600-ft. railroad spur will be built to the plant site to facilitate transportation of raw products. Plant facilities will also include 12 steam-curing rooms and a storage yard of 2,000,000-block capacity. Production at the new plant is expected to be started sometime in July. The company will continue to produce other types of concrete and concrete products at its present plant site.

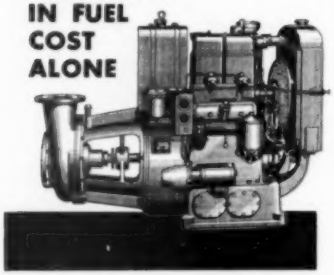
Correction

In the April, 1951, issue of ROCK PRODUCTS, under "Display of Concrete Masonry Equipment," concerning the Concrete Industries Exposition at Cleveland, Ohio, it was stated that Fleming Manufacturing Co., Inc., St. Louis, Mo., had on display a full-size operating unit, its FMC-400 tamper. The item should have read "FMC-400 vibrator." The FMC-400 is definitely a vibrator and not a tamper block machine.

Sand & Gravel Operator

SAVES $100.00

PER MONTH IN FUEL COST ALONE



***with* NORDBERG**

Diesel Pumping Unit

Read what Mr. V. F. Stich, Sand and Gravel Operator of Lena, Illinois, has to say about his Nordberg 2-cylinder 30 hp "4FS" Diesel Pumping Unit:

"I was using a gasoline engine powered pump to furnish water for my gravel washer. This engine, during a ten hour day, used about 35 gallons of gasoline to deliver 200 GPM for the gravel washing operation. Several months ago I replaced this unit with a Nordberg type 4FS Diesel pumping unit. My Nordberg Diesel uses only 16 gallons of low cost Diesel fuel and I'm getting the same capacity out of the new pumping unit. That change to Nordberg is saving me about $100.00 a month just in fuel costs alone."

This is but one more example of results users get with Nordberg 4FS one and two-cylinder Diesel power units for pumping, electric service, and straight power jobs . . . in sizes up to 30 H.P. or 20 K.W.—all offering maximum economy, reliability, safety and long life.

Send for Free Catalog Today!

Nordberg Mfg. Co.,
Milwaukee 7, Wis.

Send catalog covering both 1 and 2-cylinder Nordberg Diesels. I am interested in a unit for the following service:

Your Name _____
Company Name _____
Address _____
City _____ Zone ____ State _____
4FS551

NORDBERG MFG. CO., Milwaukee 7, Wis.

NORDBERG
BUILDERS OF AMERICA'S LARGEST LINE OF HEAVY-DUTY DIESELS

NEW MACHINERY

Light Capacity Fork Trucks

THE YALE & TOWNE MANUFACTURING CO., Philadelphia Division, Philadelphia, Penn., has announced a completely redesigned line of light capacity fork lift trucks. Available in capacities up to 2000 lb., it is said that the trucks feature simplified automotive-type controls, hydraulic lift and compact size. The manufacturer states that they are designed to fill the needs of manufacturing companies and distribution concerns that desire sit-down operation, combined with a short wheelbase and maneuverability.



Lift trucks up to 2000-lb. capacity

Truck Mixer Line

COOK BROS. EQUIPMENT CO., Los Angeles, Calif., has available truck mixers in a complete range of sizes to meet a variety of requirements. The manufacturer states that an outstanding and controversial feature of the mixer, known as the Challenge, is the elimination of the drum seal. It is said that when loaded to rated capacity the machine will operate without the seal and will not spill concrete even on exceptionally steep grades. The blade design in the drum cone is said to hold all the materials in the drum until the discharging operation is started.

Fork Trucks

BAKER-RAULANG CO., Baker Industrial Truck Div., Cleveland, Ohio, announces two new fork truck lines. The Type FC center-control fork trucks are designed for convenience, maneuverability and utility in the handling of 3000- to 6000-lb. loads. To handle 5000- to 6000-lb. loads efficiently, economically and safely the company recommends its Type FT center-control fork truck in that capacity class. It is said that to facilitate ease and simplicity of operation these are provided with a shockless automotive-type of steering wheel and one pedal which controls power and braking.

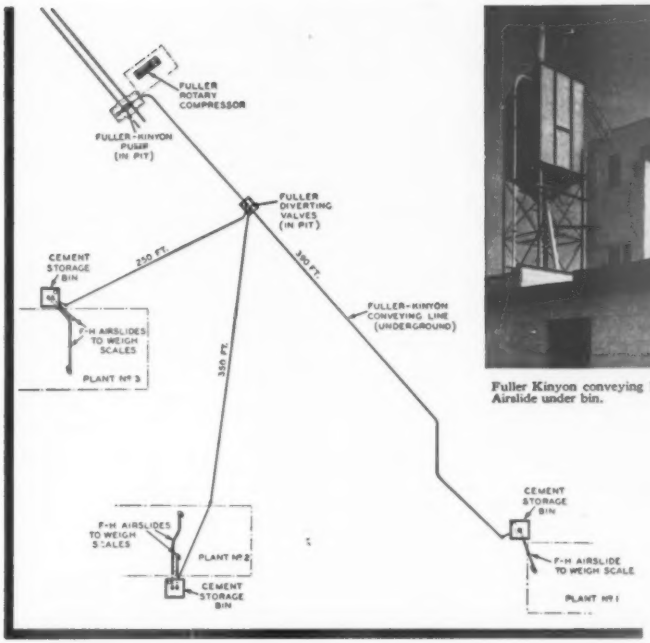


Fork trucks for 3000- to 6000-lb. loads



Truck mixer of 5-cu. yd. capacity

SURVEY AND STUDY BRING RESULTS



Fuller Kinyon conveying line entering storage bin. Airslide under bin.

in Paturzo's Concrete-Block Plant

When the engineers of V. Paturzo, Bro. & Son, Inc., Baltimore, Maryland, needed conveying equipment for their large, modern concrete-block plant, they turned to Fuller for suggestions and aid in selecting the most efficient method for handling Portland cement. As a result of studies made, Paturzo has standardized on Fuller equipment wherever possible to do so.

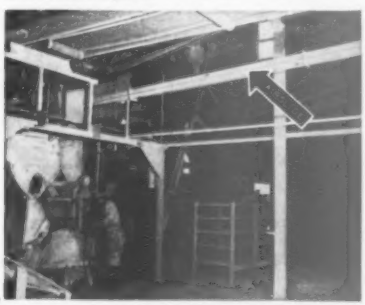
All cement, received in hopper-bottom cars, is conveyed by a Fuller-Kinyon Pump to storage bins in three different locations in the plant. This pump has a capacity of 200 barrels an hour.

And, they didn't stop there . . . they installed F-H Airslides underneath all the bins, for controlled conveying of cement to weigh scales over the mixers. These Airslides, equipped with F-H Airfeeders and F-H air motor-operated cut-off gates, above the scales, give them perfect control of each batch, in addition to clean operation and minimum power consumption.

Why not have our engineers make a survey of your conveying and submit their recommendations, based strictly upon your particular requirements. No obligation, of course.



Two Airslides and Airfeeders conveying from storage bin to weigh scales in plant.



Airslide delivering to weigh scale over mixer in plant.

G-64

Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS • COMPRESSORS AND VACUUM PUMPS FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY
Catasauqua, Pennsylvania
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.



Made by Williams, this is the broadest selection of fine Cement and Mortar colors on the market. By offering your customers a choice of 23 shades, you can quickly and easily settle upon one having the exact chemical and physical properties your color specification requires.

Cement Colors by Williams

Here you have a choice of 18 shades—6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

Mortar Colors by Williams

Here you have a choice of 5 different shades—one shade in double strength red, light buff, dark buff, chocolate and black. Each of these colors may be used with excellent results with any standard mortar mix or with a ready-made Bricklayer's Cement.



Write today for color samples and complete technical information on how Williams Cement and Mortar Colors give you superior results. Address Dept. 10, C. K. Williams & Co., Easton, Pennsylvania.

WILLIAMS
COLORS & PIGMENTS

C. K. WILLIAMS & CO.
East St. Louis, Ill. Easton, Pa. Emeryville, Cal.

FORUM
ON CURING CONCRETE PRODUCTS

conducted by
WILLIAM J. SHORE

The author herein begins the first of a series of questions and answers on the subject of curing concrete products which will be published monthly.

Question

Please advise us what course to take to correct the following steam curing condition.

Our daily 8 hr. production is 3200 standard 8 in. cinder block. Our kiln is 60 ft. in length, 24 ft. in width and 7 ft. 6 in. high. Walls are of 8 in. cinder block, roof is of 2 in. thick concrete planks resting on 8 in. I-beams which span the walls. There is a set of sliding barn doors at each end of the kiln.

Steam is furnished by a 10-hp. vertical upright fire tube boiler oil-fired low pressure. During the cold winter weather we start this boiler at 4:30 and leave it in operation till 7 a.m. the following morning.

When the kiln is opened in the morning great clouds of steam vapor come out, the block are wet and cold and when they are carried out to the yard, in a matter of an hour or so they are coated with ice.

We use calcium chloride to hasten the setting process, but in spite of this, the block are far from hard and must be handled most carefully in removing them from the racks, and our labor costs consequently are extremely high.

Any information you might have would be appreciated.

Answer

Your difficulties are due to the following causes:

(a) Insufficient steam generating capacity,
(b) Curing the entire production in one lump instead of gradually as they are made,
(c) Present roof has no heat retaining capacity with too much heat loss,
(d) Doors do not fit tightly and allow steam to escape.

(a) To steam cure 3200 block at one time requires from 30- to 50-hp. boiler capacity. We recommend that you install the larger size.

(b) The kiln should be divided into three longitudinal sections each 8 ft. wide. Then when the first one gets loaded in a matter of 2.5 hr. steam is turned on, and by the time the next kiln is ready and loaded steam may be turned off at the first kiln and applied to kiln 2. With a capacity of 50 hp. these block may be brought up to 160 to 170 deg. F. in a matter of 2.5 hr.

The roof of concrete planks is a poor insulating medium and you lose great quantities of heat through there. We suggest that you install a false ceiling of 2 x 4 beams. Cover the underside of these with a moistureproof membrane. Install above the wood beams common blanket rock wool insulation. This combination will eliminate the loss of heat through the roof.

(c) Replace present type of sliding doors with tight fitting metal clad lightweight doors that fit tightly. They should be easy to handle and at the same time be so designed that they prevent loss of heat from the kiln.

(d) The present 10-hp. steam boiler unit is entirely inadequate to steam cure a production of 400 block per hour. The minimum required is 30 hp. to do this work. We always suggest that the larger sizes be installed because we find that it is only a matter of a few years when block production becomes increased and more steam capacity is required.

Upon carrying out the above recommendations, you will find it unnecessary to use either calcium chloride or high early cement.

Concrete Hog Troughs

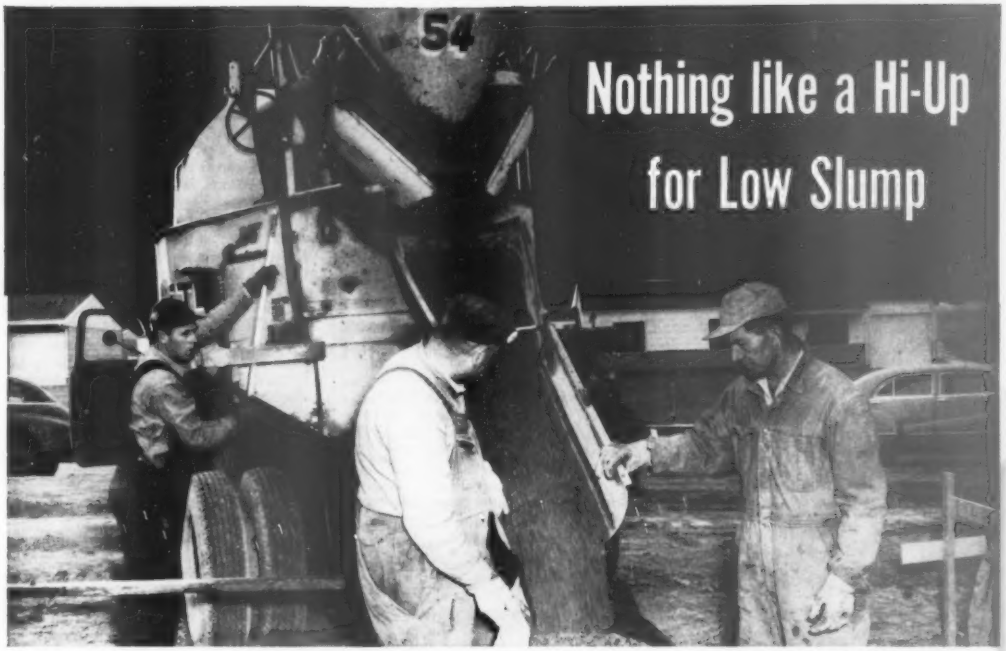
MANUFACTURERS OF CONCRETE products who wish to participate in diversified fields and in the development of the farm market might be interested in manufacturing miscellaneous products like the concrete hog feeding troughs of the Nashua Tile Co., Nashua, Iowa. The troughs, in this case, are produced on a Columbia concrete block machine, which is a combination vibration-pressure type. The mold, which is attached in place of any block mold, turns out troughs which weigh about 50 lb. and hold 6 qt. Two men, working all day, were able to produce approximately 100 troughs by the hand-tamping method, while by the new process, a three-man crew is capable of turning out 125 to 150 troughs per hour.



Automatic block machine fitted with mold to make concrete hog troughs

Concrete School

A QUALITY CONCRETE COURSE, sponsored by the Milwaukee office of the Portland Cement Association, was held in Manitowoc, Wis., March 7. It was conducted by engineers of the association. P. J. Grogan, Milwaukee, and B. E. Brevic, Appleton, Wis., gave talks and led discussions on cold weather concreting; concrete floor construction; handling, placing and curing concrete, and concrete design.



All over the country, Worthington-Ransome Hi-Up Truck Mixers are out-performing other makes!



Photo of 4½ cu yd Worthington-Ransome Blue Brute Hi-Up Truck Mixer fleet operated by Concrete Inc., Denver, Colorado.



Photo of 5½ cu yd Worthington-Ransome Blue Brute Hi-Up Truck Mixers operated by Lattanzio Transit Mix Co., Inc., Schenectady.

Compare them on the basis of charging and discharging time . . . compare them on the basis of maintenance—

You'll find that Worthington-Ransome Blue Brute Hi-Ups score way ahead of other makes.

You'll surely want to experience results like these—

Fred D. Hoppe, vice-president, Concrete Inc., Denver, says, "Charging and unloading time is the lowest in our fleet of 26 units. We particularly like the way they discharge low and no-slump concrete. We experience less 'down time' with these machines than anything else in our fleet." Mr. Hoppe purchased *six more!*

Lou Lattanzio, Lattanzio Transit Mix, Schenectady, says of his 5½ cu yd Hi-Ups: "We are very pleased with the discharge rate even with low-slump concrete. There has been no appreciable mechanical trouble." Mr. Lattanzio "expects to standardize on Hi-Ups."

So join the growing list of Hi-Up fleets, which include Pine Hill Concrete Mix, Inc., Buffalo—over 40 Hi-Ups; Southern Materials Corp., Richmond and Norfolk—over 20; Buzby Brothers, Westville, New Jersey—over 20; Fenton Materials Co., San Diego—over 20.

See your nearby Worthington-Ransome distributor for a demonstration. Worthington Pump and Machinery Corporation, Construction Equipment Division, Dunellen, New Jersey.

BUY BLUE BRUTES

WORTHINGTON

R.1.4



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB



THE Cleveland Type LSRR air vibrator is equipped with a cast steel male bracket which fits the female bracket that is standard equipment on most covered hopper railroad cars.

The LSRR is air-operated and is easily adapted to bins, hoppers, chutes and mine cars. Female brackets are obtainable from us for any application where only periodic vibration is required.

You can get gentle, easy vibration against the skin of your materials handling container or heavy, hammer-like blows, because, with AIR, the intensity of vibration can be varied at will.

BIN STUCK LATELY? No need to be. The LSRR will eliminate your troubles in a matter of seconds. Catalog No. 106 will give you further details.

THE CLEVELAND VIBRATOR COMPANY

2713 Clinton Ave. • Cleveland 13, Ohio

Agricultural Pipe Convention

MORE THAN SIXTY people attended the first annual convention of the American Concrete Agricultural Pipe Association held in the Westward-Ho Hotel, Phoenix, Ariz., April 19-21. Matters of interest to the concrete irrigation pipe and concrete drain tile industry were discussed in great detail.

On Thursday, April 19, the meeting of the board of directors was held. The board listened to the report of the managing director and the secretary-treasurer. The program for 1951 was formulated. A budget was prepared and rates of dues established sufficient to implement the program determined upon.

The open meeting on Friday began with a welcome by Mayor Nicholas Udall of Phoenix, followed by the presentation of guest speakers by President Williamson. Howard G. Curtis, chief, Canals Section, Bureau of Reclamation, Department of Interior, Denver, Colo., spoke on "The Bureau of Reclamation and Concrete Pipe." Prof. A. F. Pillsbury, associate professor of irrigation, University of California, Los Angeles, spoke on "Design and Installation of Plain Concrete Pipe Irrigation Systems to Prevent Failure." Both of the addresses were followed by question and answer periods. The addresses and subsequent discussion will be published in the association's proceedings of the meeting.

John T. Kimball, vice-president, Central Arizona Light and Power Co. of Phoenix, Ariz., was a luncheon speaker. His stirring address was entitled "This is Our Problem."

In the afternoon, discussion about the addresses of the morning was continued. The nominating committee composed of A. M. Herman of the Concrete Conduit Co., Colton, Calif., and A. C. Clarke of the Valley Concrete Pipe Co., Inc. of McAllen, Texas, submitted its report followed by reports from the president, managing director, and secretary-treasurer with discussion on all from the floor. This was followed by election of officers and directors for 1951 as follows:

Gilbert D. Williamson, Valley Concrete Pipe and Products Co., Yuba City, Calif., president; J. W. Porter, Gifford-Hill-Western, Inc., Dallas, Texas, vice-president; George F. Lillie, Platte Valley Cement Tile Manufacturing Co., Scottsbluff, Neb., secretary; W. B. Freeman, Lock Joint Pipe Co., Denver, Colo., treasurer; Elmer L. Johnson, Concrete Conduit Co., director; and Hugh P. Ford, Eugene Concrete Pipe & Products Co., director.

In the evening some 48 members and guests attended the cocktail party and dinner. On Saturday, April 21, the new board held its meeting, electing an executive committee composed of Messrs. Williamson (chairman), Lillie and Johnson; a constitution bylaws committee composed of Messrs. Porter (chairman), Freeman and Peckworth; a specifications and technical problems committee composed of Messrs. Johnson (chairman), Porter, Lillie, Williamson, Clarke, and Ford.

Messrs. Williamson and Clarke were reappointed representatives to the board of governors of Concrete Pipe Associations, Inc.

It was decided to hold the second annual convention in Denver, Colo., in February, 1952, at the close of the week preceding the Chicago convention of American Concrete Pipe Association. On Friday of that week there would be a tour of the laboratories of the Bureau of Reclamation with a board meeting in the evening. On Saturday the open meeting would be held followed by the new board meeting on Sunday. Then those who wish could proceed to Chicago to attend the convention of the American Concrete Pipe Association.

Specifications

A tentative draft of a reinforced concrete low head pressure pipe specification was distributed at the meeting and discussed. This draft had been prepared by Howard G. Curtis, chairman of a sub-committee of Committee C-13 of A.S.T.M., delegated the task of preparing such a specification.

Materials Handling Conference

THE MATERIALS HANDLING CONFERENCE, sponsored by the American Materials Handling Society, was held concurrently with the Fourth National Materials Handling Exposition, at the International Amphitheater, Chicago, Ill., April 30-May 4, 1951.

The exposition was the first to be held since the one in Philadelphia over two and a half years ago. An estimated $10,000,000 in new models of materials handling equipment were displayed by 240 companies.

Papers on handling problems were presented at the conference by many nationally known experts. Of particular interest to the building block industry was a paper on "Yard Handling of Building Block and Brick—With Fork Trucks Equipped With Pneumatic Forks and Sideshifters," by W. R. Blommel, assistant manager, Truck Division, Service Caster & Truck Corp., Albion, Mich. Mr. Blommel stated that after much research, a type of fork has been developed that will handle a maximum number of block sizes and, at the same time, will eliminate many other difficulties formerly encountered. Since it was agreed by various block plants throughout the United States and Canada that a cube 48 x 48 x 48 in. would be standard, a 4-tine fork for block and a 5-tine fork for brick were adopted. Mr. Blommel also stated that the fork can be attached to any fork truck of any make or model. Depending on the commodity and weight to be handled, 50-300 block per cube, and 500-1200 brick per cube can be lifted. A sideshifter is recommended for use in conjunction with the fork to en-

able the truck operator to spot a cube tight against the others without jockeying. It was stated that by using this fork and sideshifter, breakage is virtually eliminated and a skilled operator can load four cubes in five minutes.

Among other papers presented were ones covering such topics as: Increased Production With Yard Handling; Application of Incentives to Yard Material Handling; Recommended Outdoor Storage-Handling Methods; Increasing Capacity Through Efficient Handling; The Relationship of Material Handling to the Other Departments of Your Business; Basis for Making Material Handling Surveys and Cost Studies; Place of the Materials Handling Engineer; The Need for Closer Cooperation Between Shippers and the Trucking Industry; Training and Plant Operating Efficiency; Improvement of Working Conditions Through Mechanized Handling Methods; Relation of Labor and Equipment; Integrating Material Handling with Production; Reduction in Handling Costs and Labor; Equipment Selection Factors; Use of Pallets and Skids; The Economics of Palletizing; and, Factors in Arriving at Economical Methods of Handling Materials.

Allen K. Strong, Materials Handling Section, American Cyanamid Co., New York, N. Y., was general chairman of the Material Handling Conference.

N.C.M.A. Technical Report

National Concrete Masonry Association recently published a technical report on "Protective Coatings for Steel Racks." The report discusses the problem of protecting racks from continued corrosion, and the value of various coating materials. Realizing that the service life of steel racks would be substantially increased if rusting could be prevented or retarded, the association has spent considerable time in study and reseach of the matter. From information and opinions received from various sources, the association undertook a limited investigation of the value of several selected coatings. The final inspection and evaluation of the coatings were made after seven to nine months of exposure to regular service conditions. The racks were used five to six times per week and were subjected to various weather conditions. Considering maintenance coatings which can be applied at the plant, the tests indicated that petrolatum base compounds containing rust inhibitors offer the best all-around coating from the standpoints of protective value, ease of application and low cost, as was reported by N.C.M.A. Materials of this type which performed well in the tests are Texaco Rustproof Compound L and Mid-Continent No. 766 DX Rustproof Compound.

Also included in the technical report was a list of suggestions for the maintenance and care of the racks.

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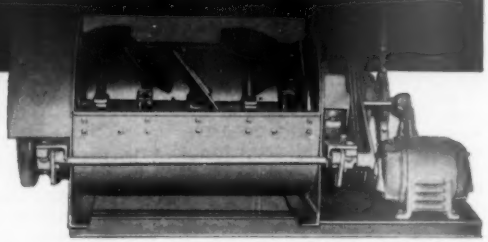
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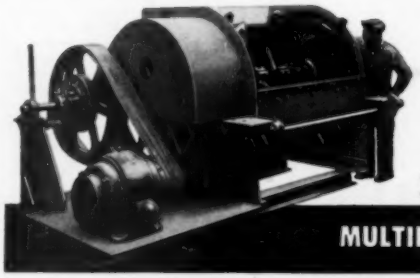
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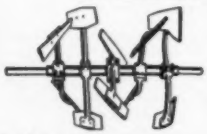


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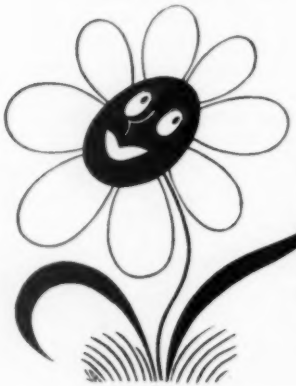
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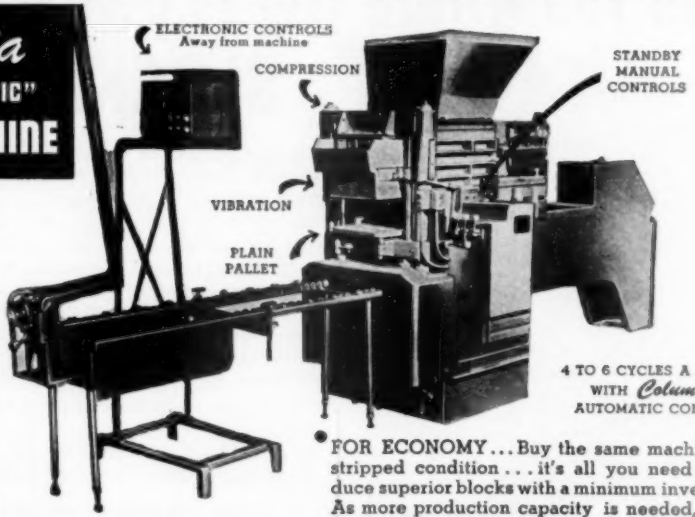
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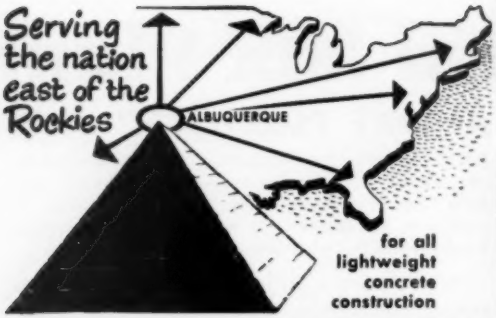
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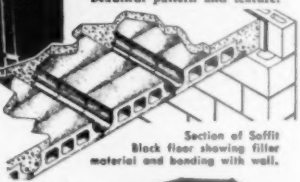


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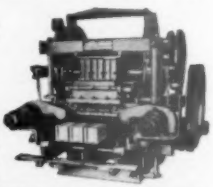
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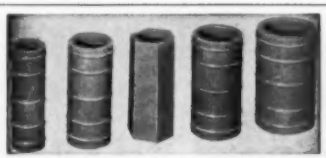


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314 Merchant St. — Emporia, Kans.

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Both McCracken Type and Martin Trowelers—PROVED to last as long or longer — yet cost considerably less. Write for prices.

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WANTED

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ROSS SAND CO., Concordia, Kansas

WANTED

Multiplex concrete chimney block machine. State price and conditions.

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Box 157 — Hillsboro, Oregon

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Can be the answer to your light weight aggregate problem if you operate vibrating equipment.

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for information
or write

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CHICAGO 6, ILLINOIS
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CEMENT COLORS
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manufactured by
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Write for full information

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With FORMULA NO. 640

A clear liquid—7 different resins in a solvent which penetrates ¼" or more into concrete, concrete blocks, stucco; seals, holds 1250 psi water pressure. Applies quickly—no mixing—no furring—no maintenance—no cleanup. Use on forms—wood or concrete.
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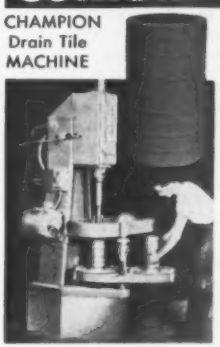
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CHAMPION
Drain Tile
MACHINE



Farm drainage—home building—reclamation projects—highway construction. From these and other sources comes the biggest demand for drain tile in history. More local plants are urgently needed.

It's a wide-open opportunity. Either as an independent, full-time business or as a profitable addition to other concrete products.

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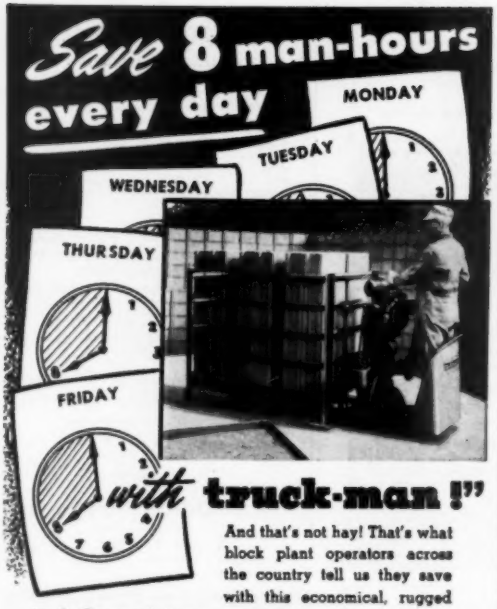
The Champion makes manufacturing easy. Pares costs. Requires no high-priced labor. Makes all sizes up to 12-inch. Yet calls for only a moderate investment.

Get the Facts

Write for new Drain Tile Book. Tells about the possibilities in the drain tile business—costs of materials—selling prices—etc. Also completely describes the new Champion machine.

CONCRETE EQUIPMENT CO.
542 Ottawa Avenue
HOLLAND, MICHIGAN





And that's not hay! That's what block plant operators across the country tell us they save with this economical, rugged truck. One man's time . . . every day . . . the whole year 'round . . . *that* adds up!

You save up to $300.00 and more during the first month you put Truck-Man to work in your block or brick yard . . . and you continue to save at that rate during years of faithful, dependable Truck-Man service.

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Your most profitable VISITOR

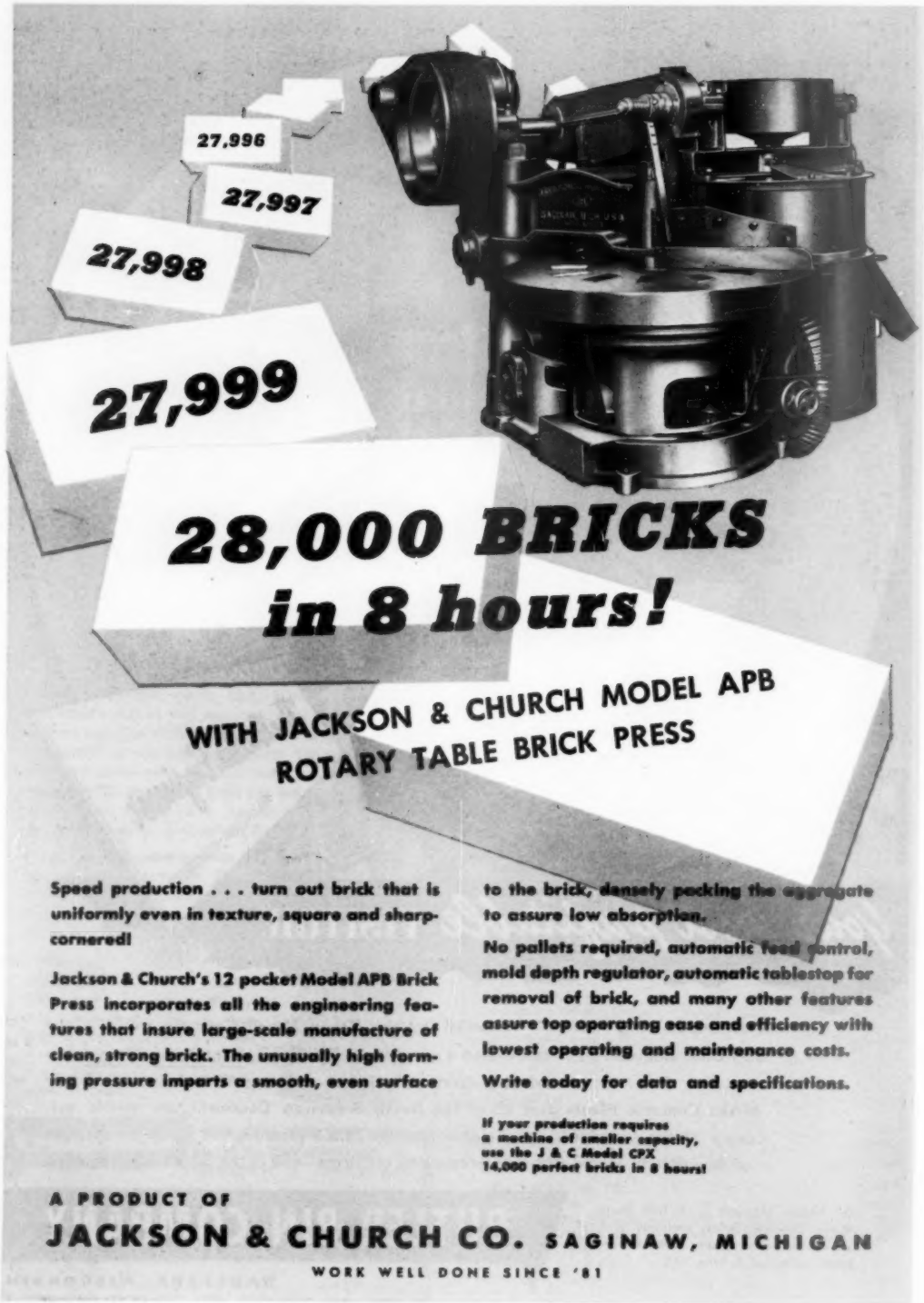
Well known and warmly welcomed by the Ready Mixed Concrete world is the BUTLER Engineer. For more than a generation BUTLER Engineered Design has advanced the concrete industry from a technical and a profit standpoint. Ready Mixed Concrete Plants over all of the North American Continent are visible evidence of the soundness and ingenuity of BUTLER planning . . . So, in the solution of your Ready Mixed Concrete production problems—call in the BUTLER Engineer.

For typical examples of BUTLER Ready Mixed Concrete Plants, profusely illustrated with photographs and detailed plans, write for Bulletin 185.

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28,000 BRICKS
in 8 hours!
WITH JACKSON & CHURCH MODEL APB
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Speed production . . . turn out brick that is uniformly even in texture, square and sharp-cornered!
Jackson & Church's 12 pocket Model APB Brick Press incorporates all the engineering features that insure large-scale manufacture of clean, strong brick. The unusually high forming pressure imparts a smooth, even surface to the brick, densely packing the aggregate to assure low absorption.
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If your production requires a machine of smaller capacity, use the J & C Model CPX 14,000 perfect bricks in 8 hours!
A PRODUCT OF
JACKSON & CHURCH CO. SAGINAW, MICHIGAN
WORK WELL DONE SINCE '81



ALLIS-CHALMERS LARGE MOTORS ...Combine Protection & Accessibility

MAINTENANCE COSTS are dealt a double blow by this new line of Allis-Chalmers squirrel-cage induction motors. First, its protective design features minimize the need for maintenance operations. Then, its planned accessibility cuts the cost of doing the maintenance work.

How Maintenance is Reduced

In these motors, protection begins with drip-proof construction. But it does not end there. Air discharge openings in the stator yoke are given the added protection of removable louvered panels. Air intakes in the rigid cast iron end shields are located so as to prevent injury to the windings by mishandled tools or other objects. Capsule-type bearing housings protect the bearings and oil supply when the windings are being cleaned. The capsules can remain sealed against abrasive dirt throughout the cleaning operation.

How Costs Are Cut

This added protection has been achieved without sacrificing accessibility. One man can perform all routine maintenance operations. To check the air gap he simply removes a few screw-type plugs from the bearing end shields.

For cleaning, he removes the upper halves of the end shields and reaches right inside the motor with his vacuum cleaner or air hose. And there is plenty of room to reach up back of the stator core through the air discharge openings in the sides of the yoke.

Wide Range of Sizes

These modern-design drip-proof (or splash-proof) cage motors are built in sizes from 60 hp at 300 rpm to 2000 hp at 1800 rpm. Ask your Allis-Chalmers representative to show you the details of this exceptional new motor, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletin 05B7542.

A-3405

ALLIS-CHALMERS

HETHERINGTON & BERNER



with wear-resisting semi-steel or manganese parts

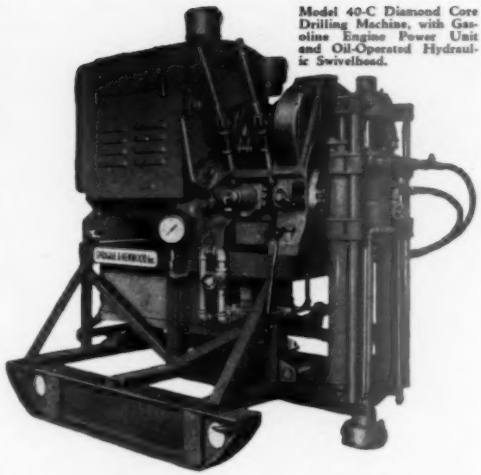
H & B sand and gravel pumps are built in two general types: STANDARD (in 4″, 6″ and 8″ sizes) for use under ordinary working conditions and moderate heads, and DREADNAUGHT (in 6″, 8″, 10″, 12″ and 15″ sizes) for the tough, heavy-duty jobs with stringent head conditions. These performance-proven pumps are available promptly with either semi-steel or manganese parts.

Special bases and variations of drive arrangement may be had to meet special requirements. Your inquiries on pumping problems will have the prompt attention of H&B engineers, who have had many years of specialized experience solving such problems. Write for Bulletin DP-147.

HETHERINGTON & BERNER INC.
717 Kentucky Avenue, Indianapolis 7, Indiana

Illustration shows an H & B pump installation in a typical small pit operation.





Model 40-C Diamond Core Drilling Machine, with Gasoline Engine Power Unit and Oil-Operated Hydraulic Swivelhead.

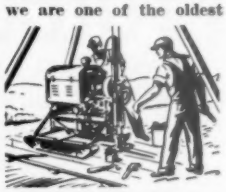
MODEL 40-C

THE BEST MACHINE for Most Core Drilling Jobs

This is our latest model — designed for highest possible percentage of good core recovery on jobs up to 1000 ft. in depth (⅞″ core) no matter how severe the operating conditions. Rugged construction, liberal use of alloy-steel parts and anti-friction bearings throughout, permit long periods of high-speed drilling at minimum expense. Other modern machines and a complete line of improved accessory equipment provide for every drilling and sampling requirement. Write for catalog.

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"TRUCAST" BORTZ DIAMOND BITS

have proved their superiority for years in all types of rock formation. Available in a wide variety of standard and special types ranging from 1½″ to 7¾″ in diameter. All bits set with first-grade African bortz unless otherwise specified. Bulletin 44-A gives complete information.

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Dept. R. SCRANTON 2, PENNA.

See our four-page insert in the Mining Catalogs

RESISTO-LOY *will lengthen life of*

CONE CRUSHER LINERS 50% or more

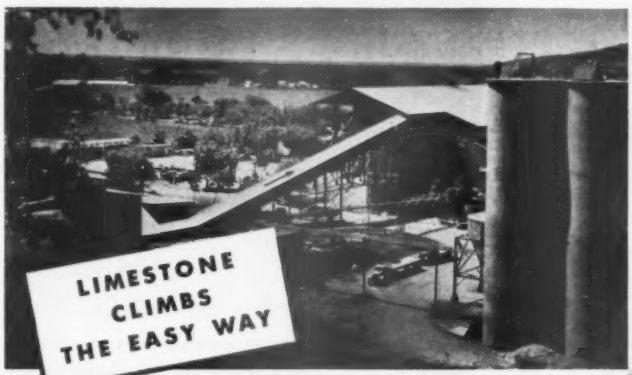
There are many types and sizes of Cone Crusher Mantles, and most of them can be hard-surfaced with RESISTO-LOY to extend their life by 50% or more.

This type of liner should be given a single application of RESISTO-LOY when new. No attempt should be made to rebuild this type of liner when badly worn. A single application of RESISTO-LOY costs but a fraction of the cost of a new liner.



This job is NOT recommended for the plant maintenance welder, as special equipment is required to handle these liners during the application of RESISTO-LOY. Ask our Field Man to visit you and show you how to effect this important saving.

RESISTO-LOY CO., Manufacturers, Grand Rapids 7, Michigan



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COMMERCIAL FERTILIZER AND LIME SPREADER

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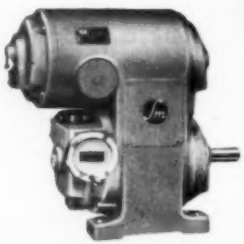
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Manufacturers of the World's Most Complete Line of Spreaders

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power modernization

lowers production costs...

with control of speed



STERLING
SPEED-TROL

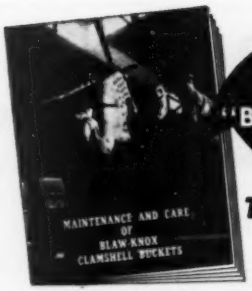
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The ONLY book available that tells . . .

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  Methods of renewing the cutting edges of worn bucket lips include special welding precautions. This section contains instructions for removing and replacing ball bearings in lever arm sheaves, lubrication instructions, and many other practical hints for care and maintenance.

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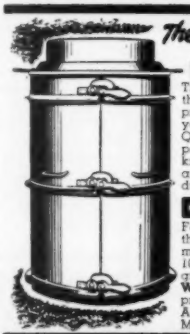
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For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.
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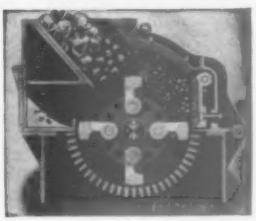
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25 to 30% greater production

Cleaner Tailings

Uniform Products

Slow speed for slow wear

Quick and easy adjustments

If you have an exceptionally hard separating problem, TRY THE GAYCO.

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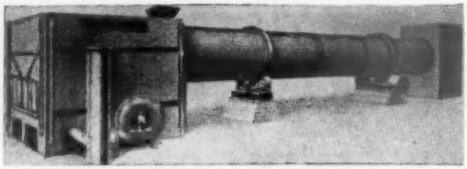
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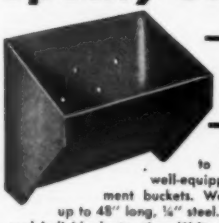
WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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when you need



ELEVATOR BUCKETS

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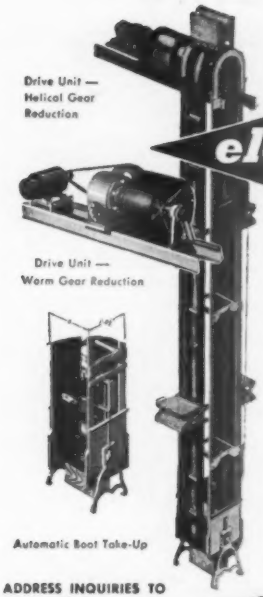
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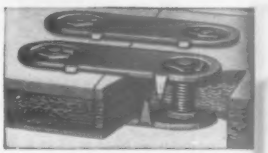
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CRUSHERS

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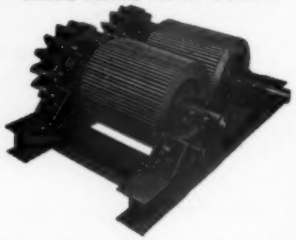
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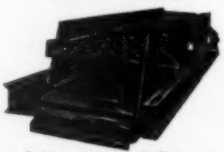
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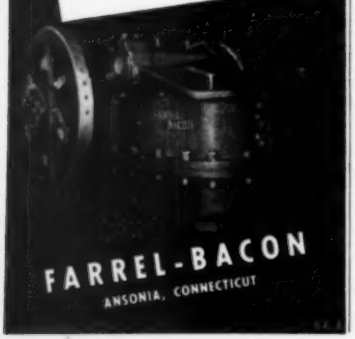
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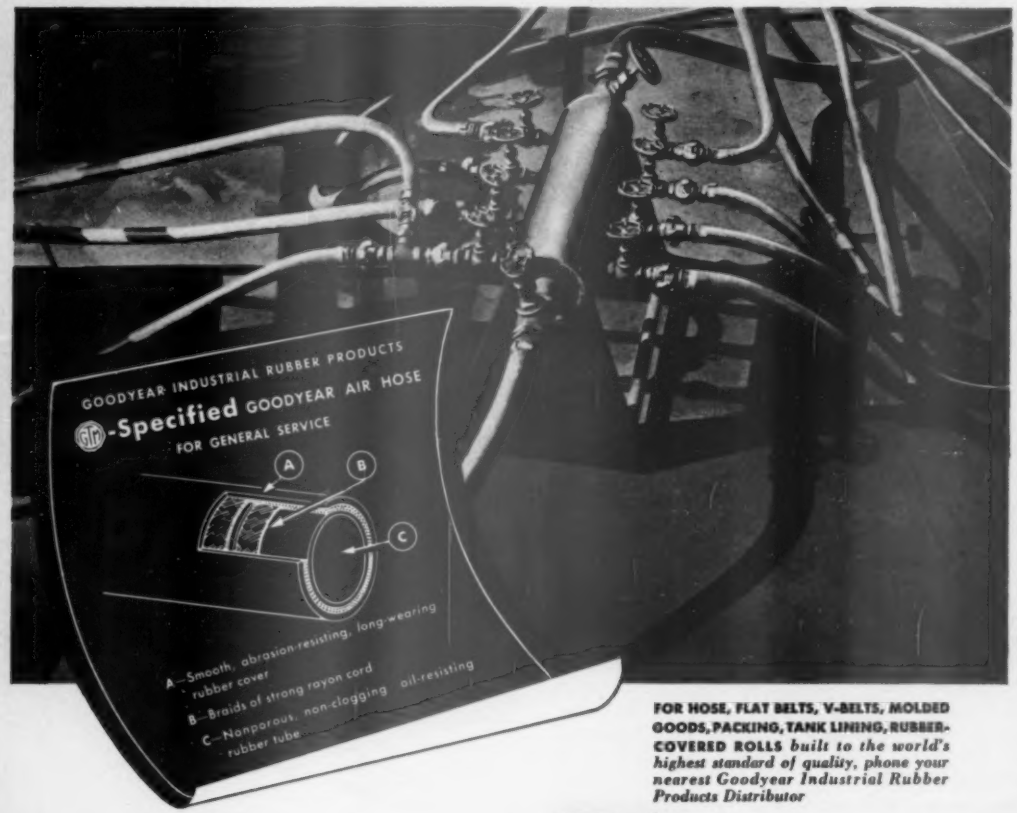
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